DIV. OF FISHES

COMMERCIAL FISHERIES REVIEW

APR 1964

VOL. 26, NO. 3 MARCH 1964

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Washington, D.C.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.
Price 60 cents (single copy). Subscription Price: $5.50 a year; $2 additional for foreign mailing.

UNITED STATES
DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY

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COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries prepared in the BUREAU OF COMMERCIAL FISHERIES.

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Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget, May 1, 1963.

5/31/68

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GULF OF ALASKA SCALLOP EXPLORATIONS--1963

By Warren F. Rathjen* and Joaquim B. Rivers**

ABSTRACT

Exploratory fishing for scallops (Patinopecten caurinus) was conducted in the waters of the Gulf of Alaska during 1963. The objective of this survey was to determine the practicality of more detailed explorations for scallops in that area. Catches of scallops were made in amounts as high as 7 bushels per 30-minute drag with an 8-foot dredge. The individual scallops ranged up to 7 inches in diameter and yielded approximately 4-6 pounds of shucked meats per bushel measure. Good catches of scallops were taken at several locations including: off Cape Fairweather at depths from 34-42 fathoms, off Icy Bay from 39-44 fathoms, and east of Cape Saint Elias where catches were taken between 54 and 56 fathoms. It is not expected that this potential resource will receive significant exploitation until (1) the range and abundance are better defined and (2) thorough consideration is given to all aspects of the economics including production, processing, and marketing.

INTRODUCTION

Over the past decade various fishery surveys in the Gulf of Alaska have established that a species of large scallop (Patinopecten caurinus) was present in moderate numbers at certain locations. Shellfish investigations were conducted with the U. S. Bureau of Commercial Fisheries vessel John N. Cobb during 1953 in the Yakutat Bay area (Schaefers and Smith 1954). In the course of those explorations, small quantities of scallops were taken with a "New Bedford"-type scallop dredge and a beam trawl. In 1961, a trawl survey over much of the Continental Shelf of the Gulf of Alaska was started under the direction of the International Pacific Halibut Commission. During that survey, moderate quantities of scallops (up to 1,000 per one-hour drag) were taken at various locations between Cape Fairweather and Cape Saint Elias at depths between 30 and 70 fathoms.

Prior to the above, there was no apparent documentation of effort to establish the abundance of the potential scallop resource in the Gulf of Alaska. However, several attempts were made in the Kodiak and Cook Inlet (Seldovia) areas to capture quantities of scallops for local use. An additional source of information was derived from reports by halibut fishermen who related that scallops occasionally clamped on to their gear (long lines) while it was on the bottom.

Surveys were also conducted in the waters adjacent to British Columbia (Quayle 1961, 1963). Those findings did not indicate any potential for a scallop industry off British Columbia.

Occasional catches of scallops were reported by trawl fishermen off the coasts of Washington and Oregon; and Fitch (1953) indicates that they are "frequently taken in considerable numbers by flatfish trawlers operating out of Eureka" (California).

A fishery for a related species Patinopecten yessoensis is carried on in the waters of Hokkaido, northern Japan (Cahn 1951).

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With this background, a modest plan of exploration was developed to determine the practicality of more complete surveys for the (Patinopecten caurinus) scallop in Alaskan waters.

METHODS

The U. S. Bureau of Commercial Fisheries vessel John R. Manning was made available for the work from May 20 to June 14, 1963 (Cruise 63-1). The John R. Manning (fig. 1) is a combination type purse seiner-trawler, 86 feet 6 inches in length. The primary sampling gear employed during the exploratory operations consisted of an 8-foot, New Bedford-type, deep-sea scallop dredge, with a $\frac{1}{2}$-inch diameter sweep chain supporting the bag of 3-inch diameter rings and $\frac{5}{16}$-inch connectors. Supplementary equipment included the attachment of

Fig. 1 - The vessel John R. Manning, U. S. Bureau of Commercial Fisheries vessel, used for scallop exploratory cruise during the spring of 1963.

"rock chains" which prevent the passage of large boulders or rocks into the bag of the dredge (figs. 2A and 2B). That equipment was obtained from a manufacturer in Massachusetts. The dredge was fished from the starboard gallows frame. The vessel's trawl winch was used for stowing and retrieving the $\frac{9}{16}$-inch diameter wire rope used to drag the dredge during the explorations. A ratio of 4:1 was maintained for wire-out-to-depth relationship.

The duration of individual scallop drags varied from 5 to 60 minutes. Most frequently the time elapsed while the dredge was fishing averaged 30 minutes. A detailed description of the gear and its operation is given by Posgay (1957).

Positions were established by direct bearings from landmarks or were made with Loran fixes. Depth and general bottom characteristics were determined with a sensitive electronic depth-recording device. Throughout the cruise fishing speed was maintained at about 2-3 knots.

Measurements of the scallops caught were taken by direct count of bushel samples from catches greater than one bushel. When catches were less than one bushel, the entire catch of

Fig. 2A - Eight-foot scallop dredge similar to the equipment used in the scallop fishery of the Northwest Atlantic. Note the rock chains ahead of the sweep chain.

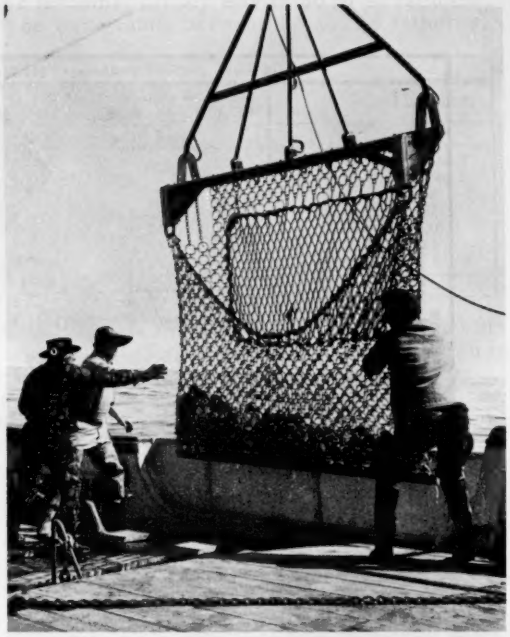

Fig. 2B - Eight-foot scallop dredge being hoisted over the rail of the John R. Manning with catch of scallops. Note that the rock chains shown in figure 2 have been removed.

individual scallops was counted. At intervals, size-frequency measurements were made of random samples. The measurements recorded provided the diameter of the shell from the hinge to the outer margin of the shell. Scallops were also shucked to determine the number of meats (eyes) per pint measure.

AREA COVERED

The investigation under discussion was conducted in the coastal area of the Gulf of Alaska between Cape Spencer and Cape Saint Elias (fig. 3). Due to the limited period available, principal effort was expended at (or close to) locations at which prior trawling had revealed the presence of scallops. The depths investigated ranged from 22 to 85 fathoms. Most of the dredging, however, occurred between 30 and 60 fathoms. The characteristics of the bottom along that part of the coast are, in general, favorable to dredging. Most of the bottom traversed consisted of sand, mud, or mud and sand, with only occasional patches of gravel, boulders, or rock ledges. Several bays and rivers join with the Gulf of Alaska in that area and a number of very large glaciers are evident.

RESULTS OF EXPLORATIONS

DISTRIBUTION AND ABUNDANCE OF SCALLOPS: Scallops of the same size as those produced in the commercial fishery of the Northwest Atlantic were taken throughout the entire range of the area investigated (fig. 4). Over 70 percent of individual dredge hauls completed produced scallops in amounts up to 7 bushels of scallops per 30 minutes of effort. The best catches were made between 30 and 70 fathoms where the scallops seemed to be concentrated in beds. Locations at which the concentrations of scallops were most promising in-

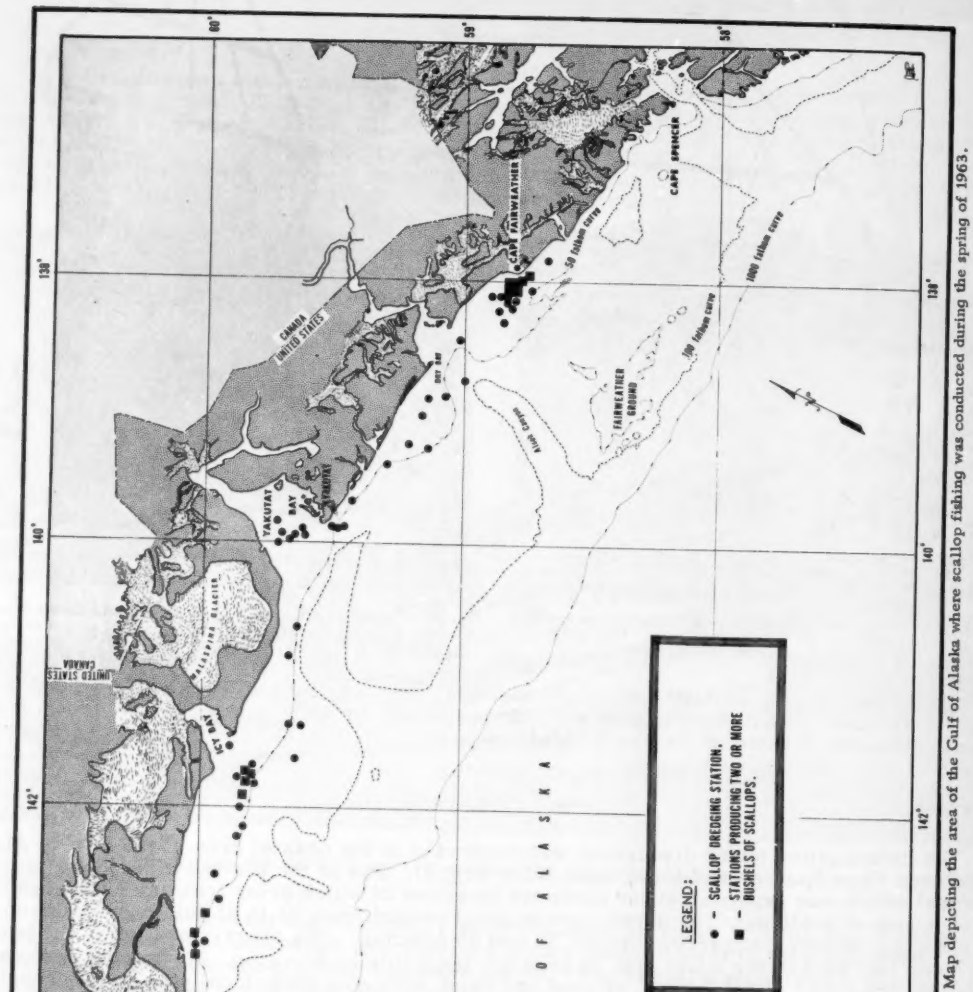

Fig. 3 - Map depicting the area of the Gulf of Alaska where scallop fishing was conducted during the spring of 1963.

cluded: off Cape Fairweather at depths of 34 to 42 fathoms; off Icy Bay in 30 to 44 fathoms; and east of Cape Saint Elias, where the best catches were made between 54 and 56 fathoms.

Distribution of Scallops (by Depth) Taken During Exploratory Fishing, 1960-63[1/]

Depth (in Fathoms)	9,333 Scallops Collected During Trawl Surveys, 1960-1962	11,754 Scallops Collected By the John R. Manning, 1963	Combined Data
	Expressed in Percentage of Total		
10-20	Less than 1	-	Less than 1
21-30	Less than 1	-	Less than 1
31-40	19	52	37
41-50	27	28	27
51-60	27	14	20
61-70	23	5	13
Over 70	3	1	2

1/All records are from area between Middleton Island and Cape Spencer in the Gulf of Alaska.

A total of over 20,000 scallops was taken by exploratory fishing vessels from the northeastern Gulf of Alaska between 1960 and 1963. The distribution of those captures by depth is summarized in table. The sampling by the John R. Manning during 1963 was primarily at depths and locations expected to be the favorable habitat for scallops as indicated by the records of earlier explorations. Catch rates of scallops ranged from 0 to 7 bushels per 30-minute drag. As the time available for explorations was limited, no production fishing was attempted. The explorations indicate a widespread distribution of the resource throughout the area surveyed.

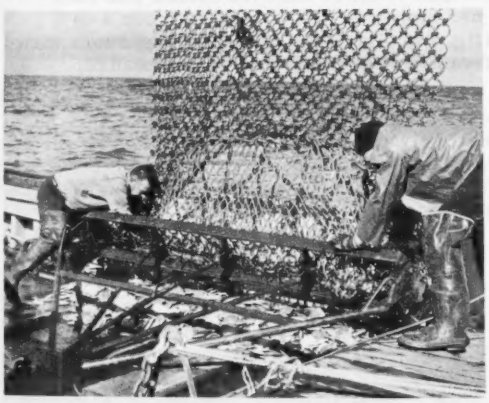

Fig. 4 - Catch of scallops from the Gulf of Alaska being dumped on the deck of the John R. Manning.

Fig. 5 - A catch of large scallops taken from the waters near Cape Saint Elias in the Gulf of Alaska.

SIZE AND YIELD OF SCALLOPS: The scallops captured during individual drags were frequently similar in over-all size, indicating a tendency toward natural segregation by sizes. A tendency toward larger average sizes was noted as sampling progressed westward from Cape Fairweather toward Cape Saint Elias. East of Yakutat Bay, the size of scallops measured ranged from $2\frac{3}{4}$ to $6\frac{1}{2}$ inches (measured from the hinge to the outer margin of the shell). Of those, 73 percent were between 3 and 4 inches. West of Yakutat Bay, the size range was from 3 to 7 inches, with 82 percent of the scallops falling between 5 and $6\frac{1}{2}$ inches (fig. 5). The number of scallops per bushel measure ranged from about 240 per bushel at the 3- to 4-inch sizes to approximately 60 per bushel for the 6- to 7-inch sizes.

Fig. 6 - Crewman shucking scallop meats from the shell. The yield of meats varied from approximately 4 to 6 pints per bushel of whole (shell stock) scallops.

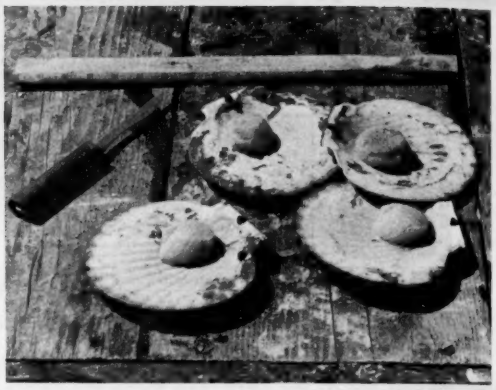

Fig. 7 - Representative size of scallops taken during explorations. Over eighty percent of the scallops were over 4 inches, when measured from the hinge to the margin of the shell.

The yield of shucked meats per bushel measure of scallops varied from 4 to 6 pints (fig. 6). The size of meats, however, varied from 15 to 60 count per pint measure.

The over-all quality of the meats was excellent and comparable in size, appearance, texture, and taste to scallops now on the market (fig. 7). Some meats from the large scallops were slightly yellow in color and had been taken from a bottom of fine green mud.

COMMERCIAL POTENTIAL

Since 1960, the commercial production of sea scallops from United States ports has averaged over 25 million pounds of meats per year. During the last 10 years production of scallops by Canadian (east coast) fishermen has increased from less than 2 million to over 10 million pounds a year. A comparison of catch rates and scallop sizes between the existing (Georges Bank) fishery and the Gulf of Alaska exploratory results reveals some cause for speculation. The maximum catch rates of 5 to 7 bushels per 30-minute drag experienced in the Gulf of Alaska stand up well to catch rates for a similar unit of effort by New England fishermen on the Georges Bank grounds (fig. 8). It is not possible to predict with any certainty the relative density of the Gulf of Alaska stocks as compared with those on Georges Bank.

The size and yield, however, is directly comparable. The average yield per gallon of meats in the Atlantic fishery is just under 200 per gallon and the approximate yield

Fig. 8 - Scallop catch aboard John R. Manning being measured in bushel baskets. Up to 7 bushels of scallops were taken during individual 30-minute drags with an 8-foot scallop dredge.

range for scallops caught by exploratory fishing in the Gulf of Alaska is 120 to 500 meats per gallon.

Alaska fisheries developments over the past 10 years have demonstrated good gains in production. Other shellfish products, king and dungeness crab, as well as shrimp, are good examples of fisheries with substantial increases.

Among the less encouraging features of the available information are the following:

1. Inadequate definition of the Gulf of Alaska scallop stocks.
2. Lack of vessels and fishermen with background suitable to enter into the fishery.
3. High labor input required to shuck scallops.
4. High operating and transportation costs.
5. No established processing and marketing chain.

In conclusion, the possible commercial utilization of recently discovered beds of scallops in the Gulf of Alaska will depend on more detailed information on abundance of the stocks along with several economic considerations.

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Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.

Alaska

FOREIGN FISHING OFF ALASKA, NOVEMBER-DECEMBER 1963:

The withdrawal of foreign fishing vessels from the waters off Alaska continued during November 1963 and by month's end less than 20 vessels remained of the more than 400 Soviet and Japanese craft operating in mid-summer 1963. A single shrimp-processing vessel and 14 accompanying trawlers constituted the entire Japanese fishing effort in that area in November. This fleet operated in the region north and west of the Pribilof Islands during most of the month. The Japanese planned to operate this shrimp fleet intermittently throughout the 1963/64 winter. Soviet fishing efforts were entirely withdrawn in November from the eastern Bering Sea and Gulf of Alaska. It was expected that the Soviet trawl fisheries will resume in the eastern Bering Sea when the ice pack advances into the trawling areas and can be used as shelter for the fishing vessels.

After an absence of Soviet fishing activities in November, the anticipated movement of Soviet winter trawling fleets into the eastern Bering Sea began in mid-December. Japanese activities remained at a low level. Soviet trawlers and associated support vessels began departing their Siberian ports in early December and by month's end about 60 vessels were concentrated in an area roughly 100 miles northwest of St. Paul Island. Those fleets were reportedly obtaining excellent trawl catches of herring and flatfish in the shallower waters adjacent to the 100-fathom curve. Soviet trawling efforts were expected to continue to increase during January 1964, expanding into areas south and east of the Pribilof Islands. The Japanese shrimp factoryship Chichibu Maru and her accompanying trawlers remained the sole Japanese fishing fleet near Alaska from November through December. This fleet has generally operated north and west of the Pribilof Islands but in December started to shift to waters along the 100-fathom curve south and east of the Pribilofs.

* * * * *

FISHERY VENTURES IN JUNEAU AREA:

A newly developed corporation started operations at a cannery site in Juneau during the latter part of 1963. Up to ten vessels may be used for producing "fresh" shellfish products. It was reported that initial emphasis is to be devoted to shrimp and crab processing with some consideration given to scallop resources investigated by the U. S. Bureau of Commercial Fisheries in the spring of 1963. The area of fishing operations being considered is from lower Chatham Straits to Yakutat.

* * * * *

KODIAK COLD-STORAGE PLANT PROCESSING DUNGENESS CRAB:

A cold-storage plant in Kodiak began processing Dungeness crab in October 1963 for shipment to various parts of the United States as fresh ocean crab. As of November, five vessels were engaged in this new industry. (Kodiak Mirror, November 8, 1963.)

* * * * *

WINTER FISHERY FOR BAIT HERRING BEGINS NEAR KETCHIKAN:

The first 1963/64 winter season delivery of bait herring to a fishery company in Ketchikan was made in December by the purse seiner Lady Alice. A good catch of 250 barrels was made in Tongass Narrows within a mile of the firm's dock which indicated the reappearance of herring in the local area after several years of relative scarcity. The winter bait fishery at Ketchikan normally accounts for 1.5 million to 2.0 million pounds of herring and provides a limited winter fishery for a few local seiners.

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SECOND CONFERENCE ON TECHNOLOGY OF KING CRAB PROCESSING:

Plans for the Second Conference on the Technology of King Crab Processing were announced by the U. S. Bureau of Commercial Fisheries Technological Laboratory at Ketchikan. It was anticipated the meeting will be held in either Ketchikan or Anchorage during the first week in May 1964.

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CRAB TAG RECOVERIES REDUCED BY HEAVY WINDS:

Only 30 tags from king crabs were returned by Alaska fishermen during December. It was the lowest monthly return of tags since the current fishing season started. The highest return was over 200 tags sent to the U.S. Bureau of Commercial Fisheries Auke Bay Biological Laboratory in November. The sharp drop largely reflected the effects of the severe storms in December that restricted the fishing fleet, although there is usually some decline over the holiday season.

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SUCCESS OF PINK SALMON EGG DEPOSITION VARIES IN SASHIN CREEK:

At the Little Port Walter Station, pink salmon eggs successfully deposited in lower Sashin Creek were only 37 percent of those available compared to 78-percent success in the upper reaches, although the numbers of female pink salmon per square yard of spawning gravel were about the same. The possibility is being studied that the difference in spawning success was due to a difference in the composition of bottom materials resulting from stream gradient. Lower Sashin Creek has a gradient of 0.1 percent while the upper spawning areas have a gradient of 0.7 percent.

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RAIL-BARGE SERVICES EXPANDING:

In April 1963, a barge service between Prince Rupert, British Columbia, and Saxman (near Ketchikan), Alaska, opened all-rail traffic between Alaska and the lower 48 States. The terminal at Saxman has truck and ferry connections to all cities in Southeastern Alaska. During 1963, about 60 mechanically-refrigerated carloads of fish moved south over the Saxman-Prince Rupert facility to various United States receiving stations. Destinations included Miami, Fla., Cincinnati, Ohio, Louisville, Ky., Pittsburgh, Pa., and Baltimore, Md.

Rail-barge connections to Alaska are being expanded. Other barge services now provide all-rail capability between Whittier (Anchorage area), Alaska, and the Puget Sound area of Washington State as well as between Whittier, Alaska, and Prince Rupert, B.C. In addition, similar service may be established between Puget Sound and Saxman and between Vancouver, B.C., and Whittier.

American Fisheries Advisory Committee

FISHERIES PROBLEMS DISCUSSED AT ANNUAL MEETING:

A number of critical issues confronting the United States fishing industry at domestic and international levels were considered at the 17th annual meeting of the American Fisheries Advisory Committee held January 22-25, 1964, at Honolulu, Hawaii.

Special emphasis was placed on the fishery resources of Hawaii and the Central Pacific Ocean. During the four-day meeting, the Committee heard discussions of Central Pacific fisheries by officials of the State of Hawaii, Government of Guam, and the Government of American Samoa. In addition, key biological and oceanographic programs were described by staff members of the U.S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu. It was stressed that this research will benefit all segments of the United States fishing industry in the Pacific and elsewhere. The Bureau's plans to aid the local fishing industry were strongly endorsed by the Committee. Other matters considered during the meeting included: (1) Atlantic tuna; (2) expansion of fishery trade; (3) fishing vessel construction legislation now pending before Congress; and (4) territorial fishing rights. The Committee also had an opportunity to tour the Bureau's research facilities at Kewalo Basin and the University of Hawaii campus, as well as tuna canning operations at a local cannery.

At the conclusion of Executive Sessions held on the last day of the meeting, the Committee urged that the United States increase its status as a high-seas world fishing nation by taking the following steps:

1. The tuna fisheries are becoming more international in nature and world tuna consumption is increasing. The United States must make every effort to increase its catch of tuna, and cooperation between government and industry is essential to achieve this goal. More modern, long-range vessels may be required to carry out a successful program of high-seas fishery expansion.

2. Steps should be taken to encourage young workers to seek employment in the fishing industry through training programs, and through modernization and mechanization of vessels and processing plants.

3. Passage of fishing vessel construction legislation is necessary for the modernization of United States fishing fleets, to provide a better environment for successfully competing with foreign nations.

4. The export of United States fishery products to all world markets is essential and can be accomplished through use of counterpart funds (foreign funds held abroad), and the Food for Peace Program.

5. The Bureau of Commercial Fisheries must actively continue its search for new products such as fish protein concentrate (fish flour) as a means of developing wider use for unused fishery resources. The expansion of the industry is greatly limited by the inability to properly utilize its catches.

6. The Bureau program to study effects of pesticides on fisheries resources should be continued to protect the public and the fishery resources of the nation.

Following adjournment of the meeting on Saturday, January 25, the Committee participated in commissioning ceremonies for the new oceanographic research vessel Townsend Cromwell, which will be operated by the Honolulu Biological Laboratory of the Bureau of Commercial Fisheries.

The American Fisheries Advisory Committee, which is composed of 20 fishing industry representatives from various parts of the United States, was organized under the Saltonstall-Kennedy Act of 1954. The Committee, which is responsible for advising the Secretary of the Interior on general fisheries matters, has held 16 previous meetings in other areas of the United States. The 17th meeting was the first to be held in Hawaii.

California

PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 63-A-7 (October 6-23, 1963) and Cruise 63-A-8 (November 4-22, 1963): The main objectives of these cruises by the California Department of Fish and Game research vessel Alaska were to: (1) measure the density, distribution, and age composition of inshore pelagic fish species; (2) measure the success of 1963 sardine spawning; and (3) collect juvenile sardines for growth studies by the U. S. Bureau of Commercial Fisheries Biological Laboratory at La Jolla, Calif.

Cruise 63-A-7 was carried out off the Mexican coastal waters of northern Baja California from Sacramento Reef to the International Border.

Cruise 63-A-8 was conducted off southern California from the International Border to Gaviota.

Sampling was accomplished chiefly by towing a large midwater trawl for 40 minutes at each station. The net was fished at night within 10 fathoms of the surface. Night-light, blanket-net stations were used as a secondary sampling technique. On the northern Baja California cruise, 26 trawl and 29 night-light stations were occupied; during the southern

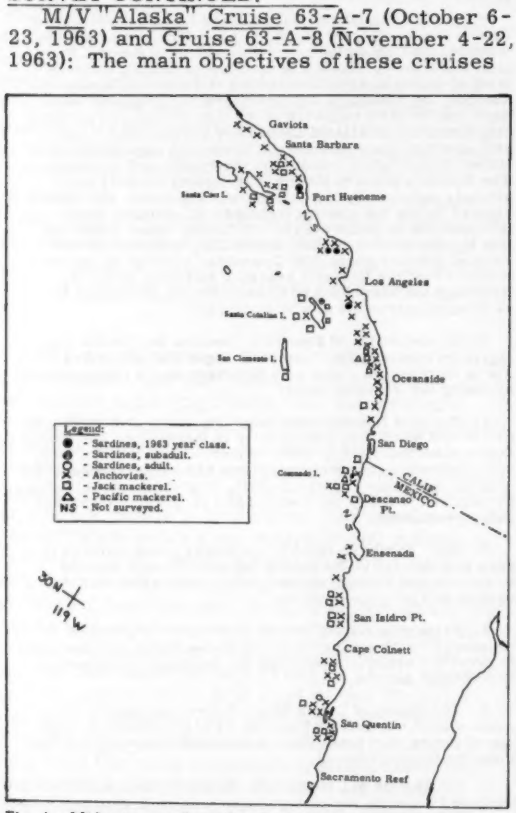

Fig. 1 - Midwater-trawl catches during M/V Alaska Cruise 63-A-7 (October 6-23, 1963) and Cruise 63-A-8 (November 4-22, 1963).

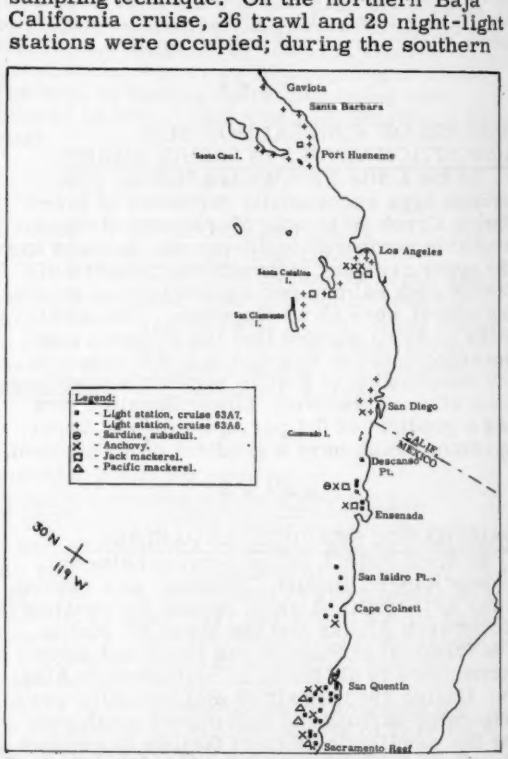

Fig. 2 - Night-light catches and night-light stations sampled during M/V Alaska Cruise 63-A-7 (October 6-23, 1963) and Cruise 63-A-8 (November 4-22, 1963).

California cruise, 50 trawl and 27 night-light stations were occupied.

Schools of fish sighted while en route between stations were identified and counted. Visual night scouting covered 142 miles off Mexico and 212 miles off California.

ANCHOVIES: Northern anchovies (Engraulis mordax) far exceeded all other species both in number caught and in number of samples taken. Midwater-trawling in northern Baja California caught anchovies at 88 percent of the stations, in amounts varying from 3 to 22,500 fish per tow. However, over three-fourths of those catches consisted of fewer than 4,000 fish, and a majority amounted to less than 500. Anchovies were taken along the entire route of the Mexican cruise, except in a small area south of Descanso Point, Baja California. Juveniles (75-90 millimeters) were predominant from Sacramento Reef to Cape Colnett, Baja California, while adults, averaging close to 130 millimeters were found from San Isidro Point to the International Border. No dense schools or concentrations were observed and only 13 small schools were sighted. Echo soundings made during trawl tows indicated a continuous scatter of fish.

Anchovies also dominated the night-light catches in northern Baja California, but catches were not as widespread or as numerous as with the trawl. (Anchovies were taken at 24 percent of the light stations.) The size of anchovies taken during night-light fishing was similar to those caught by trawling.

The size and frequency of anchovy catches off southern California were very similar to those off northern Baja California. Off southern California anchovy were caught in 84 percent of the total trawl tows, and in all but 1 inshore tow (within 10 miles of the coast). Catches ranged from 1 to 600,000 fish with most containing fewer than 500. Juveniles (75-90 millimeters) completely dominated the catch over most of the area. Pure catches of adults were made only in the Santa Cruz Island and Santa Barbara areas. As in northern Baja California, very few schools and no concentrations were observed in spite of excellent scouting conditions. During 212 miles of night scouting, only 8 small schools were seen. Extensive echo soundings failed to detect a single concentrated school, but indicated extensive areas of dispersed fish.

Night-light fishing off southern California yielded anchovies at only 4 of 27 stations, and negative results were obtained in areas that produced good trawl catches. The size and frequency of midwater-trawl catches and the absence of concentrated schools indicated an extensive, scattered anchovy distribution.

JACK MACKEREL: Jack mackerel (Trachurus symmetricus) ranked second in both trawl and night-light catches, with juveniles (45-200 millimeters) comprising almost the entire catch. Jack mackerel appeared in 54 percent of the trawl and 8 percent of the light station catches in northern Baja California. Trawl catches ranged from 7 to 2,050 fish, although only 3 tows caught over 100. The best catches off Mexico were made from Descanso Point to the Coronado Islands.

In southern California waters, jack mackerel were caught at 34 percent of the midwater-trawl stations and at 22 percent of the night-light stations. The best catches were made at San Clemente and Santa Catalina Islands, where up to 75 fish were taken per haul.

SARDINES: Sardines (Sardinops caeruleus) were scarce over the entire area surveyed. One sample was taken by night light and 1 by trawl in northern Baja California; 5 were taken by trawl in southern California. No schools were seen during night scouting. The 7 catches consisted of 3 samples of the 1963 year-class, 2 of subadults, and 2 of adults.

All of the 1963 year-class sardines were taken off southern California. They were mixed with large numbers of anchovies. The largest catch was 22 sardines in a tow containing 6,000 anchovies. Although the southern California sardine catches contained only a few fish-of-the-year, this was an improvement over the 1961 and 1962 surveys, which located no fish-of-the-year in that area. Unseasonal late summer spawning was indicated by the small fish sizes (47-70 millimeters) in 2 samples. Small sardines were not taken in sufficient numbers for the U. S. Bureau of Commercial Fisheries age and growth study.

PACIFIC MACKEREL: Pacific mackerel (Scomber diego) were not sampled in quantity although they apparently were present in both northern Baja California and southern California waters. Large schools were seen over a wide area from San Quentin to Cape Colnett, Baja California, during daylight hours, and the California commercial fleet caught 2,000 tons in southern California while the survey

was in progress. Midwater-trawl catches consisted of only 1 small sample of juvenile fish on each of the 2 cruises. Night-light stations yielded 4 samples in northern Baja California and none in southern California. It appears that both midwater-trawl and night-light fishing are ineffective in adequately sampling adult mackerel.

MISCELLANEOUS OBSERVATIONS: Off southern California, bonito (Sarda chiliensis) were the species most commonly sighted during night scouting. They were taken in 20 percent of the trawls, and 27 schools were sighted. Salps (Salpa tilesii-costata) were frequently taken on both cruises, and sometimes caused considerable clogging of the trawl while fishing off southern California. Squid (Loligo opalescens) and pyrosomes (Pyrosoma sp.) were occasionally taken in small quantities.

The trawl again proved its superiority in sampling anchovies. Anchovies were caught at 86 percent of the trawl stations but at only 20 percent of the night-light stations. The light failed to attract anchovies many times in areas where consistent trawl catches were made. Jack mackerel and sardines were taken by both types of gear, but the trawl appears to be the more efficient, especially when those species are scarce. Adult Pacific mackerel were sampled more efficiently by the night light (adults were not caught in the trawl in spite of good indications that they were present).

Weather conditions on both cruises were generally favorable. Several mechanical breakdowns on the northern Baja California cruise limited scheduled work. A newly-constructed device for recording trawl fishing depths was successfully tested on the southern California cruise.

Note: See Commercial Fisheries Review, December 1963 p. 17.

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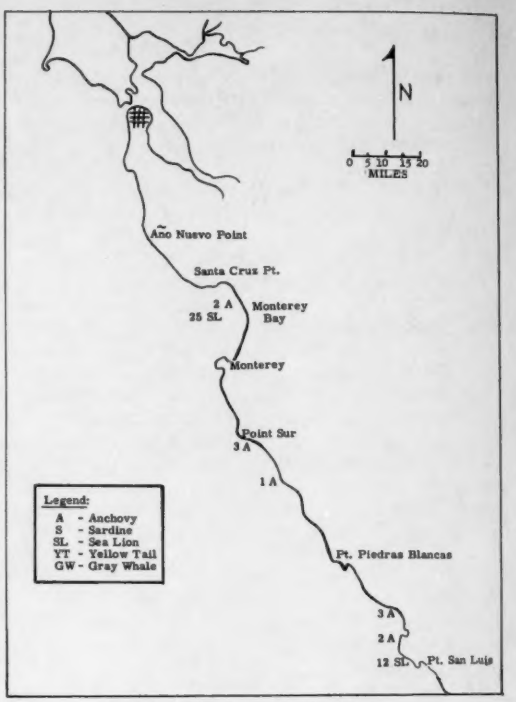
Airplane Spotting Flight 63-12-Pelagic Fish (December 16-17, 1963): The survey to determine the inshore distribution and abundance of pelagic fish schools was continued by the California Department of Fish and Game Cessna "182" 9042T during flights over the inshore area from Ano Nuevo Point to the United States-Mexican Border.

On December 16, light haze prevailed throughout the area covered from Ano Nuevo Point to Ventura, Calif. A total of 11 northern anchovy (Engraulis mordax) schools were noted at scattered localities north of Point Conception. The two largest schools were in Monterey Bay and were being preyed upon by sea birds. On the first day 37 sea lions were counted--25 in Monterey Bay and 12 off Point San Luis.



Pelagic fish survey flight 63-12.

The area from Ventura to the United States-Mexican Border was scouted on December 17. The waters from Sunset Beach to Dana Point were completely obscured by a dense, low fog bank. Light haze persisted in the remainder of the area. A total of 87 anchovy schools, 1 gray whale, 6 small Pacific sardine (Sardinops caeruleus) schools, and from 8 to 12 California yellowtail (Seriola dorsalis) were sighted. The largest concentration of anchovies was a group of 58 schools extending southward from San Clemente City for about 5 miles. Off Point La Jolla six "tightly-balled" schools of sardines were being "worked" by sea birds, sea lions, and yellowtail. Several party boats were fishing in that area.

Note: See Commercial Fisheries Review, February 1964 p. 12.

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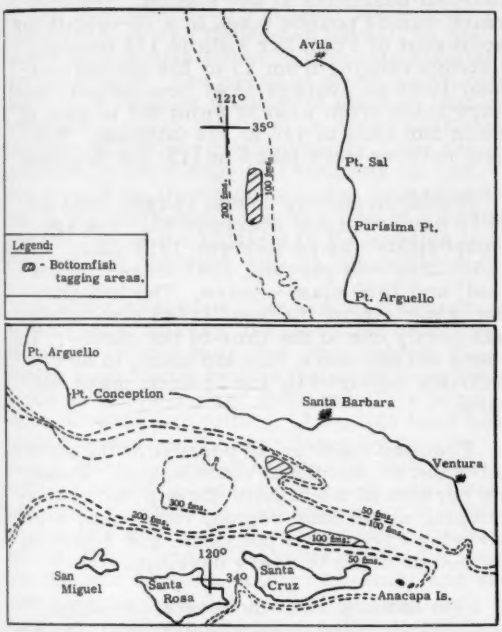
BOTTOMFISH STUDY IN SOUTHERN COASTAL WATERS:

M/V "Alaska" Cruise 63-A-9 (December 3-20, 1963): The main objectives of this cruise in southern California coastal waters by the California Department of Fish and Game research vessel Alaska were to: (1) locate and tag petrale sole (Eopsetta jordani) and English sole (Parophrys vetulus) for growth and migration studies; and (2) collect greenspotted rockfish (Sebastodes chlorostictus) and pink rockfish (S. eos) for taxonomic studies.



Fishing areas of M/V Alaska during Cruise 63-A-9.

POINT SAL TO POINT ARGUELLO: Twenty-nine tows were made in depths of 120 to 150 fathoms in this area. From those tows, 184 petrale sole and 2 English sole were tagged.

SANTA BARBARA CHANNEL: Two days were spent collecting greenspotted and pink rockfish by hook-and-line and long-line gear in 50 to 160 fathoms near Anacapa Island.

Nineteen otter-trawl tows were made in 50 to 260 fathoms. The tows produced 113 English sole and 4 petrale sole for tagging.

Cephalopods, shells, and unusual fish were collected for special studies.

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DUNGENESS CRAB SURVEY IN NORTHERN COASTAL WATERS:

M/V "N.B. Scofield" Cruise 63-S-8 (November 10-December 9, 1963): The objectives of this cruise by the California Department of Fish and Game research vessel N. B. Scofield in coastal waters between Point Arena, Calif., and Cape Ferrelo, Oreg., were to: (1) survey dungeness crab (Cancer magister) stocks off northern California to determine abundance, distribution, sex ratios, and condition; and (2) obtain information for crab life-history studies.

OPERATIONS: Ten commercial crab traps were fished overnight at 90 randomly selected stations in productive crab areas between Usal, Calif., and Cape Ferrelo, Oreg. Crab shoulder widths were recorded for the entire catch. Shell condition determinations were made for all males of legal size (7 inches or more in breadth).

Ocean shrimp (Pandalus jordani) were taken with a 41-foot head rope Gulf of Mexico otter trawl for abundance studies.

RESULTS: Of the 900 crab traps set, 5 were lost. The crab catch in the remaining 895 traps consisted of 2,142 legal-size males, 6,127 sublegal males, and 510 females. The average catch of legal and sublegal males were 2.4 and 6.8 per trap, respectively. The most productive area was between False Cape and Mad River where at 29 stations the average trap catch of legal males was 4.2 crabs. The best station catch occurred off Usal where 14.5 legal-size crabs per trap were taken.

Crabs of legal size were in good condition as only 77 (3.6 percent) were soft. The mean shoulder width of legal-size males was 166 millimeters.

The forecast for the 1963/64 northern California crab season, based on those results, is for a catch between 1.2 and 1.8 million pounds with 1.5 million as the most likely poundage. This is above the northern California crab catch in 1962/63, but far below the long-term average.

Mating activity, as evidenced by mating marks, was noted for those males at 114 millimeter shoulder width and larger. Those crabs had not undergone a recent molt. Three percent of the legal males and 11.5 percent of the sublegal males had mating marks.

Of the 510 females, 265 (52 percent) had eggs in early and intermediate stages of develop-

ment. Twenty-five live egg-bearing female crabs were retained for fertility and fecundity studies.

Note: See Commercial Fisheries Review, Oct. 1963 p. 16. and March 1963 p. 20.

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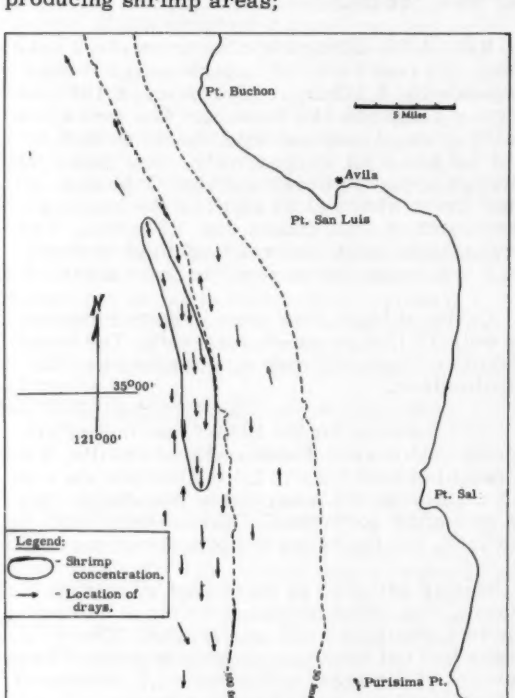
SHRIMP DISTRIBUTION SURVEY CONTINUED:

M/V "N. B. Scofield" Cruise 63-S-9 (December 12-20, 1963): The main objectives of this cruise by the California Department of Fish and Game research vessel N. B. Scofield off southern California were to:

(1) Locate concentrations of pink shrimp (Pandalus jordani), to determine population estimates and natural mortality rates;

(2) Determine size, sex, and weight of shrimp;

(3) Make bathythermograph and Nansen bottle casts to obtain bottom temperatures and water samples in both producing and non-producing shrimp areas;



Fishing area of M/V N. B. Scofield during Cruise 63-S-9.

(4) Count and weigh species of incidentally caught fish; and

(5) Save all cephalopods, rare fish, and invertebrates for the California State Fisheries Laboratory at Terminal Island.

Off southern California between Purissima Point and Point Buchon, forty 20-minute tows were made with a 41-foot head rope. Gulf of Mexico otter trawl ($1\frac{1}{4}$ inch mesh) in 60 to 159 fathoms. Shrimp were not caught in commercial quantities at any station. The best catch was 62 pounds taken in a 20-minute tow southwest of Point San Luis in 112 fathoms. Catches ranging from 15 to 186 pounds-per-hour (with an average of 47 pounds-per-hour) were made from west of Point Sal to west of Point San Luis in 142 to 105 fathoms. The best catches were taken in 112-118 fathoms.

Heads-on shrimp counts ranged from 44 to 76 per pound and averaged 62. The age composition was as follows: 1963 class--trace, 1962 class--44 percent, 1961 class--56 percent, and 1960 class--trace. The low showing of shrimp-of-the-year (1963 year-class) was partly due to the time of the survey. The young shrimp were still too small to be effectively captured by the $1\frac{1}{4}$-inch mesh net used.

Females made up 60 percent of the shrimp catch (on an individual count basis). Twenty-six percent of the female shrimp had roe developing in the head region, 73 percent were carrying eggs on the pleopock, and 1 percent showed no signs of ovary development.

Fish catches were moderate. Rockfish catches consisted mostly of stripetail (Sebastodes saxicola) and splitnose (Sebastodes diploproa). Flatfish catches were light. The most abundant species were rex sole (Glyptocephalus zachirus) and slender sole (Lyopsetta exilis). Other commonly caught fish were hake (Merluccius productus), sablefish (Anoplopoma fimbria), dogfish (Squalus acanthias), sea poachers (Agonidae), and eelpouts (Zoarcidae).

Bathythermograph casts were taken at 21 stations and bottom water samples for salinity determinations were obtained from 5 stations. Surface temperatures ranged from 13.7° to 14.9° C. (56.6° to 58.8° F.) and averaged 14.1° C. (57.4° F.). Bottom temperatures were obtained from depths ranging from 61 to 137 fathoms. Temperatures ranged

from 7.5° to 11.5° C. (45.5° to 52.7° F.) and averaged 8.7° C. (47.7° F.) at an average depth of 97 fathoms.

Note: See Commercial Fisheries Review, December 1963 p. 21.

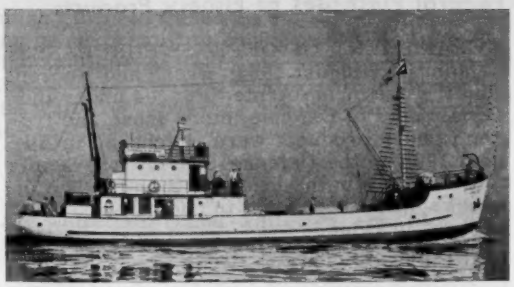
Central Pacific Fisheries Investigations

SPEED AND SWIMMING EFFORT OF TUNAS STUDIED:

The swimming speeds of various species of fish have long been a popular subject for speculation among fishermen as well as the object of investigation by naturalists and fishery scientists. The speed at which a fish can move is of obvious interest to the man who is trying to catch it, for he must adapt his fishing gear and strategy accordingly. For the scientist, a knowledge of swimming speeds can contribute importantly to his understanding of the relationships among fish of the same species and of the relation of the species to its prey, its enemies, and its competitors.

In some situations, like that of a salmon passing up a fishway, the investigator's task is comparatively easy, but the problem of timing such highly mobile fishes of the open ocean as the tunas and their relatives presents obvious difficulties. Attempts have been made to measure the time taken by fish to pass a known length of a vessel's side, and the rate at which hooked game fish can strip line from an angler's reel may provide data on possible maximum speeds under quite abnormal conditions. Estimates derived from the distance between points of release and recovery for tagged fish can be only approximate, for it is usually not possible to tell how direct a course the fish may have taken. The figures recorded in the scientific literature vary widely for the same species, and for such impressively streamlined and obviously speedy fishes as the tunas the estimates offered often appear unreasonably high.

Scientists of the U.S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu have recently succeeded, through the use of new observational techniques, in not only getting precise measurements of the swimming speeds of tuna but also relating to swimming effort. Motion pictures were taken (from the underwater viewing ports in the hull of the



The Service's research vessel Charles H. Gilbert.

Bureau's research vessel Charles H. Gilbert) of skipjack and yellowfin tuna attracted to the vessel by chumming with live bait. Projection of the pictures on the screen of a microfilm reader made it possible to plot the paths of individual tuna. The distances traveled by the fish were measured from the plots, and speeds were then calculated from the constant rate at which the camera exposes successive frames of film.

Skipjack tuna were recorded swimming at speeds from 4.5 miles per hour to a maximum of 13.1 miles per hour. Those fish averaged about 22 inches in length and would weigh about 9 pounds, which is a medium size for that species. Yellowfin tuna were photographed at speeds ranging from 4.2 miles per hour to 11.4 miles per hour. They were 20-inch or $5\frac{1}{2}$-pound fish which is considered small for that species as yellowfin tuna grow to a weight of 150 pounds or more.

The motion picture technique made it possible to count the tail beats of individual tuna and relate them to the resulting speed of forward movement. It was found that 3 tail beats per second in the skipjack moved the fish at 4.5 miles per hour, while 11 tail beats per second produced a speed of 9.3 miles per hour. Yellowfin appeared to propel themselves slightly more efficiently, getting 4.2 miles per hour from only 2 beats per second and a fast 11.4 miles per hour from 11 beats. When additional data on this relationship between propulsive movements and resulting speed have been accumulated for other sizes and species of tuna, it will be interesting to compare them in the light of what is known about the body form and behavior of the tunas.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES: January-August 1963: Fresh and Frozen: For the use of the Armed Forces under the Department of Defense, more fresh and frozen fishery products were purchased in August 1963 by the Defense Subsistence Supply Centers than in the previous month. The increase was 1.8 percent in quantity and 18.8 percent in value.

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, August 1963 with Comparisons

QUANTITY				VALUE			
August		Jan.-Aug.		August		Jan.-Aug.	
1963	1962	1963	1962	1963	1962	1963	1962
(1,000 Lbs.)				($1,000)			
1,989	2,078	15,820	16,112	1,182	1,592	8,950	9,673

Compared with the same month a year earlier, purchases in August 1963 were down 4.3 percent in quantity and 25.7 percent in value. Purchases in August 1963 included 780,922 pounds of shrimp, 281,093 pounds of ocean perch fillets, 236,285 pounds of scallops, 195,740 pounds of flounder fillets, 135,036 pounds of haddock fillets, 124,844 pounds of halibut, and 95,789 pounds of oysters, as well as substantial quantities of cod fillets and fish sticks.

Although not included in the data shown in table 1, a total of 32,900 pounds of freeze-dried fish squares valued at $164,130 were purchased in August 1963 for the use of the Armed Forces. It has been reported that the Defense Subsistence Supply Centers have been purchasing freeze-dried fish squares for about three years. The squares are prepared from cod and haddock portions and are distributed in number 10 cans.

Table 2 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, August 1963 with Comparisons

Product	QUANTITY				VALUE			
	August		Jan.-Aug.		August		Jan.-Aug.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Lbs.)				($1,000)			
Tuna	-	-	2,064	3,708	-	-	1,007	2,062
Salmon	-	-	18	1,016	-	-	12	638
Sardine	11	1	332	54	4	1/	135	77

1/Less than $500.

Canned: Purchases of canned fishery products for the use of the Armed Forces were light in August 1963.

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January-September 1963: Fresh and Frozen: For the use of the Armed Forces, less fresh and frozen fishery products were purchased in September 1963 than in the previous month. The decline was 6.8 percent in quantity and 16.1 percent in value.

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, September 1963 with Comparisons

QUANTITY				VALUE			
September		Jan.-Sept.		September		Jan.-Sept.	
1963	1962	1963	1962	1963	1962	1963	1962
(1,000 Lbs.)				($1,000)			
1,853	1,822	17,673	17,934	992	1,302	9,942	10,975

Compared with the same month a year earlier, purchases in September 1963 were up 1.7 percent in quantity but down 23.8 percent in value. Purchases in September 1963 included 553,250 pounds of fresh shrimp, 348,026 pounds of ocean perch fillets, 175,457 pounds of scallops, 171,052 pounds of halibut, 165,663 pounds of flounder fillets, 143,107 pounds of haddock fillets, and 125,945 pounds of oysters, as well as considerable quantities of sole fillets, cod fillets, fish sticks, clams, and headed and gutted whiting.

During the first 9 months of 1963, fresh and frozen purchases were down 1.4 percent in quantity and 9.4 percent in value from those in the same period of the previous year.

Table 2 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, September 1963 with Comparisons

Product	QUANTITY				VALUE			
	September		Jan.-Sept.		September		Jan.-Sept.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Lbs.)				($1,000)			
Tuna	647	-	2,711	3,708	290	-	1,297	2,062
Salmon	12	-	30	1,016	8	-	20	638
Sardine	43	11	375	65	15	4	150	31

Canned: Tuna was the principal canned fishery product purchased in September 1963 for the use of the Armed Forces. Purchases of the 3 principal canned fishery products (tuna, salmon, and sardines) in the first 9 months of 1963 were down 34.9 percent in quantity and 46.3 percent in value from those in the same period of the previous year. The decline was due to lower purchases of canned tuna and salmon.

Notes: (1) Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than indicated because local purchases are not obtainable.

(2) See Commercial Fisheries Review, January 1964 p. 9.

Films

NEW OCEANOGRAPHIC FILM SHOWS WORK OF MARINE SCIENTISTS:

A new oceanographic motion picture color film, "The Restless Sea," was shown over NBC-TV on January 24, 1964. The hour-long film (the latest in the Bell System Science Series) describes the work of oceanographers in searching out the complex relationships of nature in the sea.

The film combines photographed action both above and below the surface of the sea. In filmed and animated sequences, it illustrates the work of marine scientists in searching out the interwoven relationships of animals and plants in the oceans. A number of the interesting sequences include such subjects as hurricanes and mountainous waves; animal life from plankton to sharks to whales; modern scientific instruments that probe the depths to obtain a record of early life on earth; and the latest oceanographic research vessels consisting of both surface ships and undersea vehicles.

"The Restless Sea" was produced by Walt Disney Productions with the technical assistance of the Director of the Institute of Marine Science, University of Miami.

Great Lakes Fishery Investigations

WHITEFISH SPAWNING SURVEY IN WESTERN LAKE SUPERIOR:

M/V "Siscowet" Cruise 10 (November 18-December 17, 1963): The assessment of spawning whitefish in western Lake Superior was the primary objectives of this cruise by the U.S. Bureau of Commercial Fisheries research vessel Siscowet. Large-mesh gill nets ($4\frac{1}{2}$-to $5\frac{1}{2}$-inch mesh, stretched measure) fished on spawning grounds off the north end of Cat Island yielded 214 whitefish (171 males and 43 females) ranging from 17.2 to 32.0 inches long (average of 19.5 inches).

The total number of fish caught and the catch per unit-of-effort was the highest since assessment studies began in 1958. Nearly all of the fish were tagged and released. Seven whitefish, recaptured by commercial fishermen and by the Siscowet, had returned to spawn on the same grounds where they were tagged during the 1962 spawning run. Small-mesh gill nets fished on the whitefish spawning grounds caught predominately round whitefish and longnose suckers, and smaller numbers of lake herring. Water temperatures on the whitefish spawning grounds ranged from 45° to 47.5° F.

Other activities during this cruise included the collection of fertilized eggs from lake whitefish, round whitefish, and "bloater" chubs for studies of embryonic and larval development, and the collection of blood samples from eight species for electrophoretic and serological studies.

During the 1963 field season, the Siscowet caught 2,522 juvenile lake trout (1,511 in bottom trawls and 1,011 in experimental gill nets), of which 97 percent were fin-clipped. Most common in the trawl catches were lake trout planted at Bayfield, Wis., in the spring of 1962-63; gill nets caught predominately fish from the 1960-61 Bayfield plants. The survival of lake trout planted in 1960-62 appears to be better than for fish stocked in 1959 or 1963.

Gulf Fishery Investigations

Some of the highlights of studies conducted by the Galveston Biological Laboratory of the U.S. Bureau of Commercial Fisheries during October-December 1963:

SHRIMP FISHERY PROGRAM: Shrimp Larvae Studies: On three occasions, spawn were obtained from ripe female brown shrimp (Penaeus aztecus) held in the laboratory. In 1 instance, the developmental sequence of the resulting larvae was carried as far as the mysis stage, and in 2 others to the postlarval stage. Specimens of all stages were preserved for descriptive purposes. During the last experiment, the following variables or conditions were observed for their effect on rearing success:

(1) Media--eggs were spawned and hatched in bay water with a salinity of 28‰ (parts per thousand). The larvae were then isolated and held in vitamin-enriched (offshore) sea water with a salinity of 36‰ to 38‰ (parts per thousand). Water was changed daily.

(2) Antibiotics--a combination of penicillin and dihydrostreptomycin was added to the water in which the ripe females were held. The treatment depressed the level of undesirable organisms until after hatching took place.

(3) Temperature--eggs were spawned and hatched at 25° C. (77° F.). The resulting larvae were isolated and maintained at 30° C. (86° F.).

(4) Rearing Containers--eggs were spawned and hatched in fiberglass aquaria holding 80 liters of water.

For rearing, units of 30 specimens of Nauplius I were placed in 250-milliliter beakers containing approximately 100 milliliters of medium. When the larvae reached the second protozoeal stage their numbers were reduced to 10 per beaker.

(5) Feeding--during the initial feeding stage, i.e., Protozoea I, the larvae were fed diatoms (Skeletonema sp.). Newly hatched brine shrimp (Artemia sp.) nauplii were added when the second protozoeal stage was reached. The Skeletonema was eliminated from the diet at the first postlarval stage.

Excluding preserved specimens, the survival rate was 19 percent from the first nauplial through the first postlarval stage. With slight modifications in rearing procedure, an improvement in survival rate may be possible in the future. Approximately 60 brown shrimp postlarvae obtained from the rearing trials are being maintained in the laboratory. A single juvenile rock shrimp (Sicyonia brevirostris) reared from a spawn in the spring of 1963 was still surviving in late 1963.

Distribution and Abundance of Larvae: Examination of 47 plankton samples collected outside the 7½-fathom contour line between Galveston and Brownsville, Tex., in December 1962 showed that penaeid larvae and postlarvae were distributed over the entire sampling area. In December 1962, plankton tonic stages were 3 to 16 times more abundant at the 25-, 35-, and 60-fathom stations than at the 15- and 45-fathom stations. None were encountered at the 7½-fathom stations.

In November 1963, an effort was made to gain additional information on the vertical distribution of penaeid larvae and postlarvae. The findings differed markedly from those obtained during the summer of 1963 when the resulting data indicated that, although the greatest concentrations of all penaeid planktonic stages occurred at and below mid-depth (18 meters), all stages tended to move upwards during the hours of darkness. This was not the case in November when all stages were evenly distributed throughout the water column regardless of the time of day. Temperature profiles taken during the 1963 summer studies indicated a vertically stable water mass with a well-developed thermocline, whereas in November 1963, an isothermal, mixed water mass prevailed. It is believed that the (vertical) mixing process overcame the ability or need of the organisms to respond to light changes.

Florida Bay Ecology Studies: Pink shrimp (Penaeus duoarum) habitat in eastern Florida Bay was surveyed with respect to water depth, bottom type, and submerged vegetation. This provided new insight into the types of sampling gear that will be required. Four types of stationary shrimp traps were field-tested in Florida Bay as well as in parts of Biscayne Bay. The traps varied from a small rectangular plexiglas model to a 3-foot square metal trap with a 24-foot plastic lead. All types captured shrimp in shallow-water areas. The key to successful sampling apparently is the proper design and setting of the trap lead.

In addition to traps, a sampler which removes all shrimp (or a constant known percentage) from a defined area of bottom is being investigated. Capturing all the shrimp contained within a specified sample area is difficult. Some shrimp may remain buried even at night. Two approaches to the problem are being explored. One entails enclosing the area and pumping all shrimp within it out of the bottom mud or sand into a screened container at the surface. A second approach involves enclosing the area and, by means of a built-in trap, removing all the shrimp enclosed. This procedure may necessitate using a repellent or attractant to get all the shrimp out of the mud and into the trap. Such "drop traps" can be fished overnight. Some success has been obtained with both methods and further developmental studies of the sampling techniques are planned.

Surveys of Postlarval Abundance and Fisheries for Bait (Juvenile) Shrimp: Rearing experiments were started during the fourth quarter of 1963 to determine the accuracy of present techniques for identifying postlarval shrimp. The regular semiweekly samples of postlarvae were preserved and identified. In addition, live postlarvae, taken at the same time and place, were reared to identifiable size in glass aquaria supplied with sea-water from a recirculating system. Three such rearing experiments were completed. In each instance, there was a discrepancy of less than 5 percent between the identification of the field-preserved postlarvae and those reared to the juvenile stage in the laboratory.

As usually happens late in the year, the number of postlarvae in sample catches declined rapidly during the fourth quarter of 1963.

The catch composition of juvenile shrimp from Galveston Bay indicated that brown shrimp juveniles left the bays earlier in 1962 than in 1963. Commercial bait shrimp production in the Galveston Bay area during November 1963 was down sharply from that in the same month in 1962, while fishing effort showed an increase in November 1963.

Shrimp Catch and Fishing Effort in Galveston Bay Bait Fishery, 1962-1963

Month	Year	Catch	Catch Composition Shrimp		Fishing Effort	Average Catch Per Hour
			Brown	White		
		Lbs.	. . . (Percent) . . .		Hrs.	Lbs.
October	1963	178,900	20	80	5,210	34.3
	1962	160,200	10	90	3,450	46.4
November	1963	32,300	5	95	1,440	22.4
	1962	93,500	1	99	1,740	53.7
December	1963	1/	1/	1/	1/	1/
	1962	31,400	0	100	420	74.8

1/Not yet available.

Migrations, Growth, and Mortality of Brown and White Shrimp: Of the 4,801 stained and 1,208 tagged brown shrimp released on the bottom in 5 to 8 fathoms off the Mississippi coast in June 1963, a total of 421 (9 percent) stained shrimp and 63 (5 percent) tagged shrimp were recovered by the end of 1963. More than 91 percent of the recaptured shrimp had moved less than 30 miles. The greatest movement was about 85 miles from Horn Island to Southwest Pass, the most westerly of the several mouths of the Mississippi River. Appreciable offshore movement was not apparent, as only 9 percent of the returned shrimp were captured beyond the 11-fathom depth contour and less than 1 percent beyond 16 fathoms.

Analysis of the length-at-recapture data revealed a difference between the growth rates of males and females. The data showed that during the summer, the marked males increased in size from 115 millimeters or 59 count heads-off per pound to 131 mm. (38 count) and the marked females increased in size from 115 mm. (59 count) to 135 mm. (35 count) in 4 weeks.

In August 1963, a total of 3,016 brown shrimp were stained and released in the 10- to 12-fathom range off

Aransas Pass, Tex. Of those, 58 have been returned. Most of the recoveries were made inside the 15-fathom contour and within 30 miles of the release area. The longest movement recorded was 65 miles in a southerly direction.

Returns from the white shrimp mark-recapture experiment undertaken in Galveston Bay in August 1963 appear to be complete with 411 (13 percent) of the 3,115 stained individuals having been recovered through October 1963. There did not appear to be any seaward movement of the marked group. Most of the shrimp were recovered in the upper portion of the Bay where they were released, and none were recovered in the Gulf of Mexico. Those recoveries are providing the best current estimates of growth for this species. Length-at-age data reveal that during the August-September 1963 period the experimental shrimp increased in size from 99 mm. (98 count) to 134 mm. (39 count) in 4 weeks.

Population Dynamics: One of the objectives of the work is to increase, through more accurate knowledge of fishing intensity, the reliability of mortality coefficients estimated from mark-recapture experiments. Thus, when the relative fishing power of vessels constituting a fleet is known, statistics of time spent fishing can be adjusted to standard units of fishing intensity which, in turn, bear a constant (theoretical) relationship to resulting mortality coefficients. A considerable volume of data from the two areas has been collected and is being prepared for machine processing.

CONTRACT RESEARCH: Abundance and Distribution of Pink Shrimp Larvae on the Tortugas Shelf: Plankton samples were collected with a 3-inch centrifugal pump from Buttonwood Canal at Flamingo, Fla. In addition, plankton were sampled at each of 10 stations during 3 research cruises on the Tortugas Shelf. (This research is being conducted by the University of Miami under contract.)

Analysis of postlarval data from Buttonwood Canal samples followed and a summary of results was prepared. Generally speaking, peak influx (abundance) of postlarvae always occurred in association with flood tides; smaller peaks were frequently observed during ebb tides. That relationship held during all lunar stages, although the greatest numbers of postlarvae were taken during new-moon phases. The data also suggest that, during the annual cycle in 1962-1963, there occurred two peaks in the movement of postlarvae into the Whitewater Bay estuarine complex via Buttonwood Canal. A small peak appeared in late January and early February 1963, followed by a larger peak which extended over the period July-October 1963. Some postlarvae enter the Whitewater Bay nursery grounds during each month of the year, but there may be a seasonal variation in the age, or at least in the stage of development, at which they do so. A stage (age) index based on the number of rostral spines per individual postlarva was calculated for each series of samples. Index analysis indicated that the February postlarvae were the least advanced in development and that the stage of development at entry increased steadily from July through September.

Juvenile Phase of the Life History of the Pink Shrimp in Everglades National Park (Fla.) Nursery Grounds: During the period October 19-December 19, 1963, a total of 14 nights of sampling yielded 96 collections with the channel net and 80 with the wing nets. A comparison of simultaneous catches revealed that the ratio of the number of juvenile shrimp caught in the wing nets to that of individuals caught in the channel net varied considerably. Because of inconsistent results, the channel net remains the primary sampling device while possible sources of sampling variation (in the case of the wing nets) are being explored. (This research is being conducted by the University of Miami under contract.)

Abundance of Postlarval Shrimp in Mississippi Sound and Adjacent Waters: Sampling for the occurrence and abundance of postlarval shrimp continued at 18 stations in Mississippi Sound. In October 1963, postlarval pink shrimp were found to be more numerous than either white or brown shrimp postlarvae. Thereafter, each of the three species declined in abundance and were absent from collections made in mid-December. The decline of postlarvae appeared to precede extreme drops in water temperature. (This research is being conducted by Gulf Coast Research Laboratory under contract.)

Seasonal Distribution of Postlarval Shrimp in Vermilion Bay (La.): Regular sampling at 4 weekly and 4 biweekly stations in Vermilion Bay continued. The number of white shrimp postlarvae per collection gradually declined during October 1963 with the last one appearing in a sample taken on November 2. Brown shrimp postlarvae were not found at any station after October 26, 1963. No pink shrimp postlarvae were taken during the quarter. (Southwestern Louisiana University is conducting the research under contract.)

Seasonal Distribution Patterns of Adult and Larval Shrimp in Aransas Pass (Tex.) Inlet: The tide trap was operated at or near maximum flood and ebb tides approximately three times per week throughout the quarter. Although large numbers of marine organisms were captured, few penaeid shrimp were encountered. Immediately after the passage of cold fronts, trap catches of all organisms increased greatly during ebb tides. Apparently, concomitant low tides and low water temperatures cause a mass exodus of organisms from the shallow bays, through the Aransas Pass Inlet, into the deeper shelf waters of the Gulf of Mexico.

Separation, classification, and enumeration of organisms in plankton samples from the Aransas Pass study area were accelerated. Average numbers of brown and pink shrimp larvae were calculated for all stations, depths, and sampling times within each sampling period. In general, brown shrimp postlarvae were more abundant during the late spring months while pink shrimp postlarvae were most numerous during late summer. Very few white shrimp postlarvae were taken. No larval or postlarval shrimp were found in the plankton samples from about October 1 until December 6, 1963, when a sample containing a few pink shrimp postlarvae was obtained. The occurrence of brown shrimp postlarvae could not be correlated with any recorded environmental or temporal variation such as tidal stage or time of day. Pink shrimp postlarvae always occurred in greatest numbers during highest flood tides regardless of the time of day. (This research is conducted by Texas Institute of Marine Science under contract.)

ESTUARINE PROGRAM: Ecology of Western Gulf Estuaries: Biological and hydrological sampling in the Galveston Bay system continued without interruption during the quarter. The second series of bottom fauna samplings, which included the identification and enumeration of all sample specimens, was completed. An investigation of the relationships between the distribution and abundance of bottom organisms and variations in

temperature, salinity, and bottom type was begun. In conjunction with the description of bottom types, an analysis of bottom sediments was almost completed. Checklists of the fish, shrimp, and crabs inhabiting the Galveston Bay system are being prepared. Researchers have identified 104 fish, 13 shrimp, 27 crab, and 34 mollusc species collected since January 1963. Previous literature is being reviewed to provide as complete a species list as possible. A reference collection of typical specimens has been established.

Due to the heavy rainfall accompanying the passage of Hurricane Cindy slightly northeast of the Galveston area on September 17, 1963, salinity was temporarily reduced throughout most of the Bay system and in the Gulf of Mexico near the Bay entrance jetties and in the entrance itself. Reductions of as much as 10 ‰ (parts per thousand) were noted in upper East Bay. The salinity in Trinity Bay, however, increased and remained abnormally high. In general, salinity during the fourth quarter of 1963 was lower at the Gulf of Mexico stations and in Galveston Entrance than during the previous quarter, and higher in the Bay system, with the exception of East Bay which was nearest the hurricane's path.

White shrimp, sand seatrout, and bay anchovy continued as the predominant species. Young-of-the-year Atlantic croakers began appearing in November 1963 with their numbers increasing in December. A decline in the number of brown shrimp and blue crabs was noticeable at the onset of cooler temperatures in November and December. White shrimp abundance also declined rapidly with a lowering of the water temperature during the latter half of December.

Between December 3 and 5, 1963, with the water temperature averaging 14.1° C. (57.4° F.), small white shrimp were caught at 60 of 64 stations at the rate of 38 individuals per 5 minutes of trawling with a 10-foot net. Only 8 percent of those shrimp were caught at stations located in deep channels. On December 20, at which time the water temperature averaged 8.3° C. (46.9° F.), the same species was collected at only 18 (mostly deep-water) stations at the reduced rate of 12 per 5 minutes of trawling. A limited amount of sampling activity 3 days later (December 23), when the water temperature reached a low of 2.0° C. (35.6° F.), yielded no shrimp. At that time numerous stunned and dead fish were observed and caught, including spotted seatrout, redfish, menhaden, croaker, black drum, and mullet. Neither the extensiveness nor severity of the mass mortality could be determined. Low temperatures occurred almost a month earlier this winter than last. In the previous winter (1962/63), comparable low temperatures were not recorded until the latter half of January. Last winter, white shrimp were also plentiful in the Bay system just prior to the onset of cold weather, but then virtually disappeared; and, although numerous stunned fish were also observed and collected in the previous winter, there was no indication that the low temperature had caused any mortality.

Effects of Engineering Projects: A study is being made of the possible effects of the Texas Basins Project on the fishery resources. This major project includes proposals to construct numerous upland reservoirs as well as a water transport canal to divert the flow of principal streams in water-rich east Texas to arid portions of southwest Texas. Such a plan would greatly reduce tributary inflow into most Texas estuaries. During drought years, this reduction could become critical, especially in view of other water demands which are expected in the future. Thus, from the standpoint of lowering the quality of fishery resource habitat, the proposed Texas Basins Project would compound an already critical problem.

Data thus far analyzed include, for the years 1956-1963, monthly fresh-water discharges from major rivers and streams, and the quantity as well as value of inshore and offshore harvests of fish and shellfish. Preliminary inspection of the data indicates a definite relationship between river discharge and shrimp harvest in the estuaries of eastern Texas. The data for west Texas estuaries and for fishery resources other than shrimp have not yet been analyzed.

INDUSTRIAL FISHERY PROGRAM: Life Histories of Central Gulf Bottomfish: Sampling of Atlantic croaker has been expanded to include juvenile specimens from Mobile Bay, Ala., and adult fish from the northern Texas Gulf coast.

Analysis of data on the length, age, sex composition, and reproductive status of croaker stocks was continued at an accelerated pace.

Distribution and Abundance of Western Gulf Bottomfish: In mid-fall 1963, information on the diurnal variation in the size and composition of sample bottomfish catches was obtained during a special cruise by a chartered research vessel. Results of comparative trawl hauls just above as well as on the bottom revealed, as in previous trials, day-night differences in the catchability of Atlantic croaker by bottom trawls. During periods of the day when trawling on the bottom proved ineffective, relative catches of that species increased measurably upon raising and fishing the trawl a short distance off the bottom. Sample catches of butterfish yielded similar results. The longspine porgy, though very abundant at one of the sampling depths, failed to exhibit diurnal variation in its catchability.

To facilitate night observations in a study concerning the diurnal activity of an experimental group of Atlantic croakers, a system of red floodlights was installed in a recirculating sea water system reservoir especially modified for such work.

SEA-WATER LABORATORIES: Facilities of the recirculating sea water system are being successfully used for experiments which involve raising to an identifiable size shrimp larvae hatched from eggs of known parentage. Experiments are also under way to determine if the stingray (Dasyatis sabina) is the final host of a parasitic cestode known to infect certain shrimp. In addition, researchers from the University of Texas School of Medicine are employing the facility to conduct experiments dealing with various aspects of the biochemical basis of learning in fish.

Toward the end of 1963, plans were almost completed for a long-term experiment to determine the physiological effects (if any) of marking-stains on shrimp.

BIOLOGICAL INDICATORS IN EAST LAGOON: Oyster growth experiments employing specimens suspended in the lagoon at the laboratory site revealed that the maximum increase in weight occurred during October. The average gain in October 1963 was 12.7 grams. This dropped to 8.0 grams in November, and to 4.0 grams during December. The average growth increments of oysters held in the laboratory itself, i.e., in a tank receiving the initial discharge from a circulation pump, were 2.0, 2.0, and 2.5 grams, respectively, for the same 3 months.

Note: See Commercial Fisheries Review, December 1963 p. 28.

Hawaii

SKIPJACK TUNA LANDINGS, 1963:

Skipjack tuna landings in Hawaii in December 1963 were estimated to be about 200,000 pounds--35,000 pounds below the 1948-62 monthly average for that month. The total catch of skipjack tuna in 1963 was estimated at 8,245,000 pounds, or 1,627,000 pounds below the 1948-1962 annual average for the same period.

In December there were 54 productive trips, giving an average of 1,871 pounds per productive trip. Individual catches ranged from 45 pounds to 6,975 pounds.

Industrial Fishery Products

U.S. FISH MEAL, OIL, AND SOLUBLES:

Production, December 1963: Preliminary data on U.S. production of fish meal, oil, and solubles for December 1963 as collected by the U.S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in the table.

U.S. Production 1/ of Fish Meal, Oil, and Solubles, December 1963 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized 3/
	Short Tons	1,000 Pounds	(Short Tons)	
December 1963:				
East & Gulf Coasts	6,642	5,478	2,271	-
West Coast 2/	1,749	254	986	-
Total	8,391	5,732	3,257	-
Jan.-Dec. 1963 Total	230,045	184,005	92,554	7,216
Jan.-Dec. 1962 Total	298,413	255,808	113,238	11,096

1/Does not include crab meal, shrimp meal, and liver oils.
2/Includes American Samoa and Puerto Rico.
3/Includes consensed fish.
Note: Beginning with March 1963 fish oil is shown in pounds instead of gallons. Conversion factor, 7.75 pounds equal 1 gallon.

* * * * *

Production, November 1963: During November 1963, 11,386 tons of fish meal and 10.0 million pounds of oil were produced in the United States. Compared with November 1962, this was an increase of 1,211 tons of meal and 1.8 million pounds of oil. A total of 4,139 tons of fish solubles was produced in November 1963--slightly less than in November 1962.

Fish meal production for January-November 1963 amounted to 221,056 tons--74,674 tons less than in the same period of 1962. Fish oil production for the first 11 months of 1963 amounted to 178.0 million pounds--a decrease of 77.2 million pounds. Fish solubles and homogenized condensed fish production amounted to 94,398 tons--a decrease of 28,098 tons or 23 percent.

U. S. Production of Fish Meal, Oil, and Solubles, November 1963 1/ with Comparisons

Product	November		Jan.-Nov.		Total
	1/1963	1962	1/1963	1962	1962
	(Short Tons)				
Fish Meal and Scrap:					
Herring	-	35	7,283	5,070	5,095
Menhaden 2/	8,736	7,272	173,904	238,372	238,680
Sardine, Pacific	2/4	13	2/33	702	702
Tuna and mackerel	1,959	2,241	20,242	24,910	26,559
Unclassified	687	614	19,594	26,676	27,297
Total	11,386	10,175	221,056	295,730	298,333
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	12,899
Grand total meal and scrap	3/	3/	3/	3/	311,232
Fish Solubles:					
Menhaden	3,324	2,561	71,746	84,760	84,685
Other	815	1,714	15,428	26,772	28,353
Total	4,139	4,275	87,174	111,532	113,238
Homogenized condensed fish	-	544	7,224	10,964	11,096
	(1,000 Pounds)				
Oil, body:					
Herring	279	31	5,540	5,085	5,255
Menhaden 2/	9,195	7,612	159,694	237,746	237,815
Sardine, Pacific	-	-	2/6	166	167
Tuna and mackerel	425	475	5,775	4,832	5,175
Other (including whale)	108	136	7,487	7,300	7,396
Total oil	10,007	8,254	177,972	255,129	255,808

1/Preliminary data.
2/Includes a small quantity of thread herring.
3/Not available on a monthly basis.
Note: Beginning with February 1963, fish oil is shown in pounds instead of gallons. Conversion factor, 7.75 pounds equal 1 gallon.

* * * * *

U. S. FISH MEAL AND SOLUBLES:

Production and Imports, January-November 1963: Based on domestic production and imports, the United States available supply of fish meal for January-November 1963

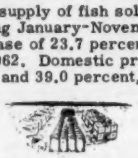
U. S. Supply of Fish Meal and Solubles, January-November 1963 with Comparisons

Item	Jan.-Nov.		Total
	1/1963	1962	1962
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	173,904	238,372	238,680
Tuna and mackerel	20,242	24,910	26,559
Herring	7,283	5,070	5,095
Other	19,627	27,378	40,898
Total production	221,056	295,730	311,232
Imports:			
Canada	47,177	40,470	42,806
Peru	268,938	173,099	186,249
Chile	23,197	8,475	9,247
So. Africa Republic	9,374	9,984	10,084
Other countries	3,942	1,302	3,921
Total imports	352,628	233,330	252,307
Available fish meal supply	573,684	529,060	563,539
Fish Solubles:			
Domestic production 2/	94,398	122,496	124,334
Imports:			
Canada	1,902	1,236	1,335
Iceland	55	2,205	2,332
So. Africa Republic	191	1,717	1,717
Other countries	1,465	763	924
Total imports	3,613	5,921	6,308
Available fish solubles supply	98,011	128,417	130,642

1/Preliminary.
2/50-percent solids. Includes production of homogenized condensed fish.

amounted to 573,684 short tons--44,624 tons (or 8.4 percent) more than during the same period in 1962. Domestic production was 74,674 tons (or 25.3 percent) less, but imports were 119,298 tons (or 51.1 percent) higher than in the same period in 1962. Peru continued to lead other countries with shipments of 268,938 tons.

The United States supply of fish solubles (including homogenized fish) during January-November 1963 amounted to 98,011 tons--a decrease of 23.7 percent as compared with the same period in 1962. Domestic production and imports dropped 22.9 percent and 39.0 percent, respectively.



Maine Sardines

CANNED STOCKS, JANUARY 1, 1964:

Canners' stocks of Maine sardines on January 1, 1964, were 29,000 cases less than those on hand January 1, 1963, but were 919,000 cases above stocks on hand two years ago on January 1, 1962 (the pack for the 1961 season was unusually small).

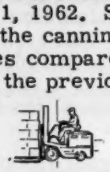
A total of 60,000 cases or 23.0 percent of distributors' stock were held in warehouses of retail multiunit organizations on January 1, 1964, compared with 67,000 cases or 24.7 percent a year earlier.

The 1963 season pack totaled 1,584,000 standard cases, according to the Maine Sardine Council. On April 15, 1963, carryover stocks at the canners' level amounted to about 660,000 cases. Adding the 1963 season pack results in a total supply of 2,244,000 cases as of Jan. 1, 1964--up 4.4 percent from the total supply reported Jan. 1, 1963, and higher by 98.9 percent from the short supply of 1,128,000 cases as of Jan. 1, 1962. Shipments in 1963 from the start of the canning season amounted to 1,181,000 cases compared with 1,057,000 cases shipped in the previous year.

Table 1 - Canned Maine Sardines--Supply as of December 31, 1963, with Comparisons

Item	1963	1962	1961
	..... (Std. Cases 1/)		
Canners' carryover stocks on April 15 2/	660,000	33,000	457,000
Season pack 2/	1,584,000	2,117,000	671,000
Total supply at end of year	2,244,000	2,150,000	1,128,000

1/100 3¾-oz. cans equal one standard case.
2/The usual legal packing season in Maine, extending from April 15 to Dec. 1, was in effect during the 1961 and 1963 season. The 1962 season was extended to 13 months--Dec. 2, 1961-Jan. 1, 1963--but the 1962 pack canned before April 15 was insignificant.

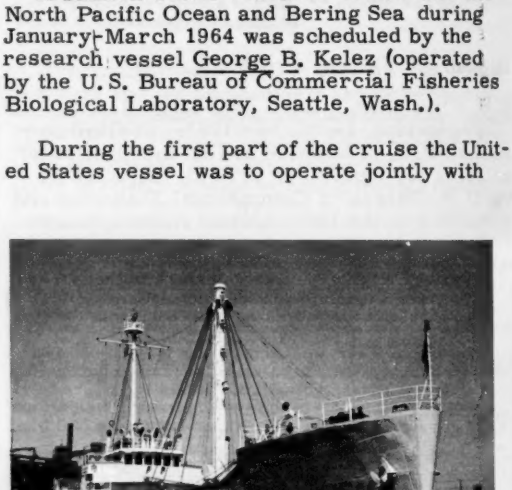


North Pacific Fishery Investigations

JOINT UNITED STATES-CANADA SALMON RESEARCH IN NORTH PACIFIC:

A salmon winter research cruise into the North Pacific Ocean and Bering Sea during January-March 1964 was scheduled by the research vessel George B. Kelez (operated by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Seattle, Wash.).

During the first part of the cruise the United States vessel was to operate jointly with



Research vessel George B. Kelez of the U. S. Bureau of Commercial Fisheries.

Table 2 - Canned Maine Sardines--Wholesale Distributors' and Canners' Stocks, January 1, 1964, with Comparisons 1/

Type	Unit	1963/64 Season		1962/63 Season					1961/62 Season				
		1/1/64	11/1/63	7/1/63	6/1/63	4/1/63	1/1/63	11/1/62	7/1/62	6/1/62	4/1/62	1/1/62	11/1/61
Distributors	1,000 actual cases	261	308	217	215	264	271	230	134	99	148	193	202
Canners	1,000 std. cases 2/	1,063	1,255	643	536	699	1,092	1,348	374	50	45	144	221

1/Table represents marketing season from November 1-October 31.
2/100 3¾-oz cans equal one standard case.
Note: Beginning with the Canned Food Report of April 1, 1963, U. S. Bureau of the Census estimates of distributors' stocks were based on a revised sample of merchant wholesalers and warehouses of retail multiunit organizations. The revised sample resulted in better coverage. The January 1, 1963, survey was conducted with both samples to provide an approximate measure of the difference in the two samples. That survey showed that the estimate of distributors' stocks of canned Maine sardines from the revised sample was 13 percent above that given by the old sample.
Source: U. S. Bureau of the Census, Canned Food Report, January 1, 1964.

the Canadian research vessel G. B. Reed in a salmon fishing and tagging operation covering the North Pacific Ocean between the North American coast and longitude 180° and extending from the Alaskan coastline and Aleutian Islands arc to approximately latitude 41° N. Following that phase of the cruise, the George B. Kelez was to sail into the Bering Sea and fish stations between longitudes 175° E. and 170° W. and extending north as far as weather and ice conditions permitted.

The research cruises of the United States and Canada are part of a continuing study to determine salmon distribution and abundance, migration routes during the winter months, and to study ecological and oceanographic factors affecting salmon. The research vessels of both countries were to fish Japanese long-line gear to catch salmon for tagging. The United States also was to carry on comparative fishing with gill nets.

The cruise of the George B. Kelez was to take about 2½ months with the vessel returning to her home port of Seattle about the end of March.

Nutrition

RESEARCH PROGRAM ON COMPOSITION AND NUTRITIVE VALUE OF FISHERY PRODUCTS:

Only very little documented information on the composition and nutritive value of fish and fishery products has been available. Such information would be valuable to scientists who are planning programs of basic and applied fisheries research since much essential information necessary for such problems would be immediately at hand. Also, a knowledge of the composition and nutritive value would enhance the marketing of various species of fish and shellfish. The American people have become increasingly diet conscious and are demanding more knowledge on cholesterol, vitamin, mineral, and caloric content of various food items.

In view of this, the U. S. Bureau of Commercial Fisheries early in 1963 initiated a research program on the composition and nutritive value of fishery products. The program is being conducted by scientists at the Bureau's Pascagoula Technological Laboratory.

The following data is being accumulated on the composition and nutritive value of fish products: (1) Proximate composition (moisture, oil, protein, ash, carbohydrate), (2) Amino acid analysis, (3) Trace mineral content, (4) Vitamin content, (5) Essential fatty acids, (6) Sterols and phospholipids.

As the data is collected it will be the objective of the Pascagoula Technological Laboratory to set up an automatic data processing (ADP) center for assembling and making available information on the nutritive value of fishery products on a national scale. The availability of an ADP would add to the value of the data because it could be evaluated statistically as influenced by various factors. The principal factors involved in this study include: (1) influence of seasonal changes; (2) influence of geographical considerations; (3) influence of inter-species relationship; and (4) influence of type of tissue.

Another objective of the study is to publish a nutritive profile of each species of fish of major commercial importance, both in terms of 100 grams of meat and in terms of table portion size. This would be of considerable help to the dietician or housewife in preparing well-balanced meals.

Oceanography

INDIAN OCEAN EXPLORATIONS BY THE "PIONEER"

The U. S. Coast and Geodetic Survey research vessel Pioneer sailed from San Francisco, Calif., on February 11, 1964, for a six-months cruise in the Indian Ocean that will involve a traverse of more than 27,500 miles. The 312-foot oceanographic vessel is participating in the International Indian Ocean Expedition. This five-year study (1960-64), involving about 25 countries and 44 vessels, is sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). One of the major objectives of the expedition is the location and subsequent development of new fisheries in the area.

The scientists aboard the Pioneer will study the Indian Ocean's physical, chemical, meteorological, geological, biological, and geophysical aspects. It is anticipated that a wealth of new knowledge will be accumulated.

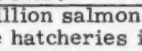
Among the subjects of detailed exploration will be undersea canyons, including the Ganges Submarine Canyon in the Bay of Bengal and the Trincomalee Submarine Canyon off Ceylon. Elsewhere during the cruise, the Pioneer will study the deep trenches found en route, including the Java, Philippine, Palau, and Yap Trenches, as well as the Mariana Trench off Guam, the deepest spot on earth.

Scientists will chart the mountains and valleys of the ocean floor; photograph the bottom with deep-sea cameras; study its subsurface structure; and take samples of marine rocks and sediment. They will also measure the temperature of the water at various depths (five miles deep at some points), and will analyze its salinity and dissolved oxygen content. They will also record the surface and deep ocean currents. Particular study will be given to the interplay of winds and ocean currents and U.S. Weather Bureau specialists will compile data on the atmosphere above the ocean. Scientists are especially interested in the influence of the Asiatic monsoons on the surface currents of the Indian Ocean. (U.S. Coast and Geodetic Survey, February 9, 1964.)

SALMON EGG TAKE IN 1963 SETS NEW RECORD:

Over 100 million salmon eggs were taken by Oregon State hatcheries in 1963. This included 41,895,203 fall chinook, 18,033,515 spring chinook, 40,311,943 silver salmon, 344,898 chum salmon, and 694,385 steelhead eggs. The yield in 1963 surpassed the previous record in 1939 when 91 million salmon and steelhead eggs were taken for hatchery use. In the years since the end of World War II, the average annual Oregon State salmon egg take has been 43.5 million.

With the 1963 salmon egg take far exceeding the yearling rearing capacity of the 15 Oregon State Fish Commission hatcheries, 14.5 million silver salmon eggs and 8.6 million fall chinook eggs were transferred to other Agencies, including the Washington State Department of Fisheries, the U.S. Fish and Wildlife Service, the Idaho Department of Fish and Game, and the California Department of Fish and Game. (Oregon Fish Commission, January 20, 1964.)



Preservation

QUALITY OF FISH HELD IN REFRIGERATED SEA WATER TESTED:

Better refrigeration techniques for holding fish at sea are being continually sought by the U.S. Bureau of Commercial Fisheries. This is essential since the quality of a fish product marketed for human consumption is largely dependent on the treatment received before it enters the processing plant. Several studies were under way early in 1964 at the U.S. Bureau of Commercial Fisheries Technological Laboratory at Gloucester, Mass., to determine methods for extending the shipboard storage life of fish, one of which includes the use of refrigerated sea water.

The project is being conducted in two major phases: (1) laboratory tests, and (2) shipboard trials.

The laboratory tests were conducted to determine whether or not an increase in storage life of fish can be attained when using refrigerated sea water as compared to ice. In addition, an ultraviolet sterilizing unit was installed in the sea-water tank to determine its effectiveness in reducing the bacterial load in the circulating sea water and the feasibility of installing this unit for shipboard use. Ocean perch were held in the laboratory seawater tanks at a temperature of 30° F. Samples from the same lot were held in ice for comparative purposes.

Organoleptic examinations were made at varying intervals of storage on both the raw and cooked fish. The final evaluation of cooked ocean perch by a taste panel was based on the average ratings for appearance, odor, flavor, and texture. The ratings indicated that iced ocean perch was acceptable until the 10th day, whereas those stored in refrigerated sea water were acceptable from the 14th to 17th days. Striking reductions in bacterial plate counts were found as a result of circulating sea water through the ultra-violet water unit. In two separate tests, plate counts were reduced from 12 million bacteria per milliliter to 3,000 per milliliter and 380,000 to less than 10 milliliter when circulated for 2 hours and 3½ hours, respectively.

The ocean perch vessel Judith Lee Rose (home port Gloucester, Mass.) was equipped with the necessary refrigeration equipment to conduct shipboard trials for evaluating the use of refrigerated sea water for fish storage. In

addition to the refrigeration system, an ultraviolet sterilizing unit was installed to reduce the buildup of bacteria in the circulating sea water. Several adversities were encountered during the trials carried out as of January 1964. Overheating of refrigeration condenser, malfunction of recording thermometer, breakage of ultraviolet units, and improper rate of water circulation. After the experience of 2 or 3 sea trials the shortcomings of the storage equipment were determined and subsequently modified.

During the final trial, 1,200 pounds of ocean perch were held for 10 days in refrigerated sea water circulated through the ultraviolet unit. All systems functioned properly during the entire trip, with the water remaining at a temperature of 30°-33° F. The use of refrigerated sea water for the storage of ocean perch on the vessel has a tendency to leach out the normal red color. This phenomenon had no adverse effects on the edible meat quality, but fish buyers are found to be somewhat skeptical about buying the discolored product.

Although the success of the shipboard trials was limited it is felt that much was learned concerning the technical problems encountered in setting up and operating a shipboard unit. The knowledge gained should be of considerable value on future trials.

Note: See Commercial Fisheries Review, January 1963 p. 47.

South Atlantic Exploratory Fishery Program

FISHERY EXPLORATIONS FOR COMMERCIAL SPECIES OFF GEORGIA CONTINUED:

M/V "Silver Bay" Cruise 52 (December 3-17, 1963): To continue assessment of the distribution, composition, density, and availability of bottomfish resources of the continental shelf off the coast of Georgia in depths greater than 10 fathoms was the primary objective of this 15-day cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay.

To delimit areas of trawlable bottom and to determine if "broken bottom" areas (snapper lumps) similar to those previously located off South Carolina and north Florida exist off Georgia, a preliminary survey of the topographic features of the area was made. Exploratory gear used consisted of 50/70-foot and 70/90-foot nylon, roller-rigged fish trawls with $6\frac{1}{2}$- and 8-foot bracket doors. Cod ends were 2-inch mesh.

Over 900 miles of transects were run with a "whiteline" depth recorder for fish detection and bottom discrimination. A total of 17 trawl sets were made after locating fish shoals on the recorder and 17 sets were made when there were no recorded indications of fish. The entire area surveyed was found to be trawlable with the gear used and only two minor tearups were experienced.

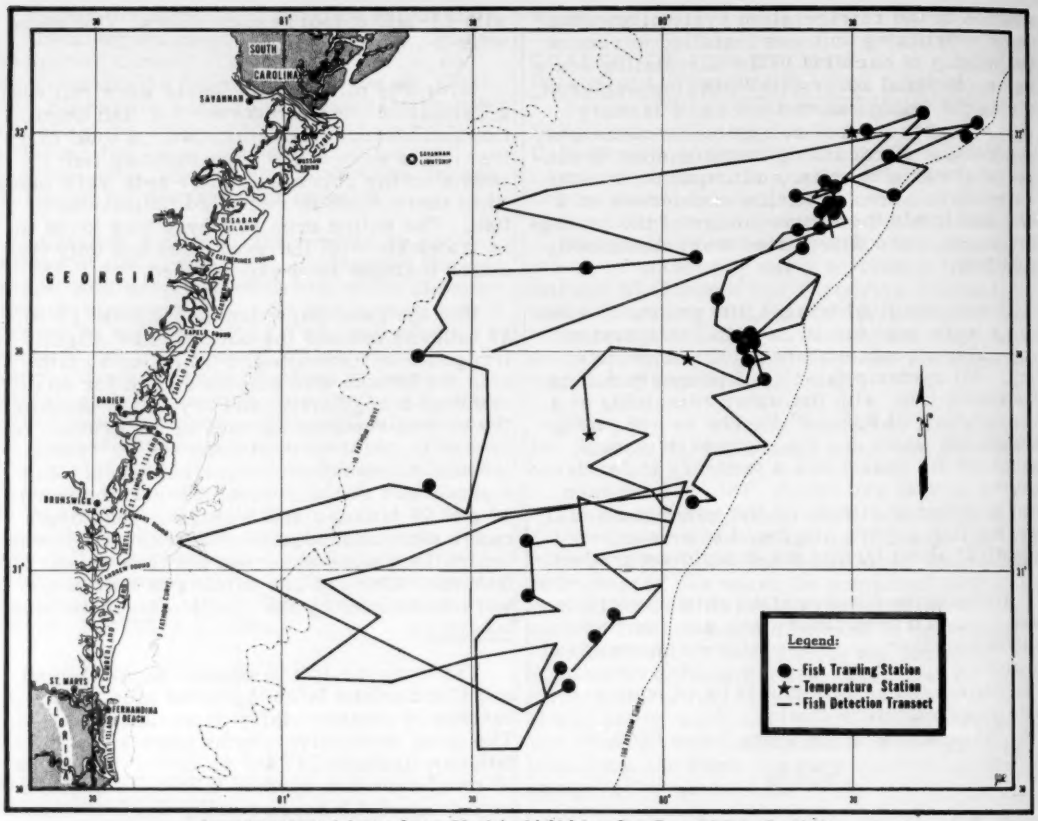
For the most part, transects from 10 to 17 fathoms showed the bottom to be slightly irregular or undulating; from 17 to 30 fathoms the bottom was smooth except for an occasional irregularity; and beyond 30 fathoms the bottom remains smooth with a gradual increase in gradient to at least the 80-fathom isobath, the maximum depth surveyed. Only 4 small fish schools were observed between 10 and 17 fathoms and 3 drags in that depth range were unproductive. Extensive fish concentrations were observed between 18 and 50 fathoms. Many of the catches in that range were dominated by the filefish (Stephanolepis hispidus).

Three areas (off Savannah, Sapelo Island, and Cumberland Island) yielded moderate catches of commercially important food fish. The most productive depths were 35 to 40 fathoms (latitude 31° 45' to 32°00' N.). The 10 most abundant species taken in 8 exploratory drags (14.3 hours fishing time) in that area were:

Species Caught by M/V Silver Bay on Cruise 52

Species		Total Weight
Common Name	Scientific Name	Pounds
Pink porgy	Pagrus pagrus	3,420
Filefish	Stephanolepis hispidus	2,578
Roughtail stingray	Dasyatis centroura	575
White porgy	Calamus sp.	570
Vermilion snapper	Rhomboplites aurorubens	511
Grouper	Mycteroperca & Epinephelus	141
Jack	Seriola sp.	113
Red snapper	Lutjanus aya	102
Grunt, tomtate	Haemulon aurolineatum	58
Black bar drum	Pareques sp.	47
Other		250
Total		8,365

One- to two-pound pink porgies dominated those catches. Black sea bass, (Centropristes striatus), white porgy, red snapper, grouper, small vermilion snapper, and gray triggerfish (Balistes capriscus) were taken in moderate numbers over a small area of broken bottom in 28 fathoms at latitude 31°31' N.,



Areas investigated during Cruise 52 of the M/V Silver Bay (December 3-17, 1963).

longitude 70°46' W. Combined catches of those species were near 600 pounds per drag east of Cumberland Island in 21 to 22 fathoms. The species composition in that area was similar to the broken bottom areas off northern Florida and South Carolina.

No recordings of bottom fish schools were observed in the 50 to 80 fathoms depth range, although two 1-hour drags in 75 to 80 fathoms yielded catches of 4,000 and 3,000 pounds of small butterfish (Poronotus triacanthus). They averaged 12 per pound and modally were 10.5 centimeters (about $4\frac{1}{4}$ inches) long. Two drags in 50 to 60 fathoms yielded small catches of butterfish and round herring (Etrumeus sp.). Strong winds halted further exploration in that depth range.

Midwater schools of fish were observed in 30 to 60 fathoms from latitude 31°10' to 31°50' N. No surface schools of fish were observed during this cruise.

Note: See Commercial Fisheries Review, July 1963 p. 52.

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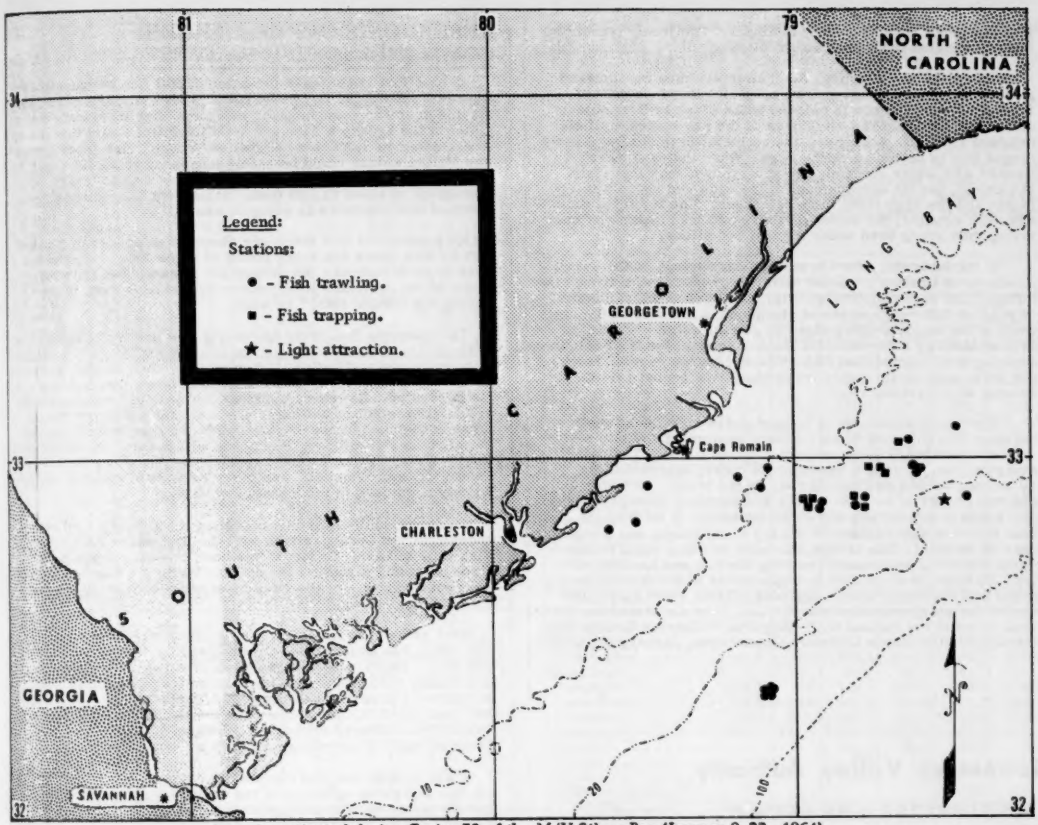
EXPLORATORY TRAWLING FOR COMMERCIAL SPECIES OFF SOUTH CAROLINA: M/V "Silver Bay" Cruise 53 (January 9-22, 1964): To determine the seasonal availability of bottomfishes to fish trawls off the coast of South Carolina was the principal objective of this 14-day cruise by the exploratory fishing vessel Silver Bay. A second objective was to conduct preliminary trials with fish traps. Explorations during the cruise were hampered by strong northerly winds.

Sixteen fishing stations were fished with a 70/90-foot roller-rigged nylon fish trawl with 8-foot bracket doors. Most catches were



Areas investigated during Cruise 53 of the M/V Silver Bay (January 9-22, 1964).

dominated by small (3 to 4 per pound) scup (Stenotomus chrysops) which were taken in amounts averaging 1,653 pounds per drag and ranging up to 2,600 pounds per 1-hour drag. Average and maximum catches of other food-fish species, on a per drag basis, were: vermilion snapper (Rhomboplites aurorubens) 57 pounds average, 500 pounds maximum; white porgy (Calamus sp.) 100 pounds maximum; pink porgy (Pagrus sp.) 100 pounds maximum; and sea bass (Centropristes striatus) 20 pounds average and 150 pounds maximum. A 1,000-pound catch of spadefish (Chaetodipterus faber) was made in 25 to 27 fathoms east of Charleston.

Six drags with a 60/80-foot shrimp trawl in the 7- to 13-fathom depth range northeast of Charleston yielded only small numbers of skates and sharks.

A total of 9 stations were covered east of Cape Romain where modified crab-type and arrowhead fish traps were used in a depth range of 13 to 17 fathoms. Catches were generally small and ranged from 0 to 70 pounds of black sea bass per trap per 3-hour set. Small numbers of puffers (Sphaeroides sp.) and individual porgies were also occasionally taken.

Note: See Commercial Fisheries Review, April 1963 p. 25.

Sturgeon

SOVIETS USE NEW TYPE EQUIPMENT TO HATCH FRY ARTIFICIALLY:

The hatching of sturgeon fry by artificial methods was reported in the January 8, 1964, issue of Pressebureauet Novostis Bulletin, a mimeographed Danish-language Soviet period-

ical published in Copenhagen, Denmark. The freely translated English version from the Danish follows:

"Scientists and practical fish culturists have encountered great difficulties in research on artificial sturgeon culture. In nature, sturgeon roe is hatched while stuck to firm objects on the sea bottom. The stickiness of the roe makes artificial hatching difficult. Also there are no methods to combat a mold fungus that is parasitic on the eggs. When the eggs were washed with water containing mud particles, they lost their stickiness, but the development of the eggs and young was affected and the eggs often were destroyed. The fry from such eggs are smaller, not uniform in size and less capable of surviving than young bred under natural conditions.

"In the laboratory for vertebrate embryology of the Soviet Academy of Science's animal morphology institute, a trough incubator has been constructed after many years of examination of roes of different species of sturgeon. According to the new method the hatching takes place in sterile water. The water is sterilized by a bactericidal machine which, for the first time, is being used in practical fish culture. Spores of mold fungus die while passing through the machine when exposed to the influence of ultraviolet rays.

"The trough incubator is simple and cheap and the most compact and spacious of all hatching equipment. Within a volume of about 1-1/2 cubic meters it holds almost 17 kilos of sturgeon roe. It uses a minimum of water, approximately 18 cc. per second per kilo of roe. In the trough incubator an optimal change of air takes place and physical damage to eggs and young is practically out of the question. It insures the best possible development of the fry at all stages and a higher rate of survival. The trough incubator renders superfluous some technical processes--washing the roe and handling the fry. Further, it simplifies transportation of the fry to planting areas and thereby curtails expenses. Tests made by the test center for sturgeon culture in Kurinsk have confirmed the practical value of the incubator." (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, January 22, 1964.)

Tennessee Valley Authority

COMMERCIAL AND SPORT FISH CATCHES, 1963:

The 1963 commercial fish catch in the Tennessee Valley Authority (TVA) water complex and impoundments was about 5.6 million pounds with a market value of some $2 million. The catch by sports fishermen amounted to more than 16 million pounds and involved expenditures by the anglers of some $41 million.

In 1963, TVA and State agencies continued studies to increase the value of fish and wildlife resources. The TVA organized a large-scale study and investigation in mid-1963 aimed at rebuilding and maintaining Tennessee River mussel beds. The average annual Tennessee River mussel harvest of 10,000 tons between 1945-1955 declined drastically in 1962--down to only 4,700 short tons.

Note: See Commercial Fisheries Review, October 1963 p. 27.

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RESERVOIRS OFFER LARGER COMMERCIAL FISH HARVEST:

In an effort to increase the commercial fish harvest in Tennessee Valley Authority reservoirs, TVA biologists are testing fishing gear and searching for industrial fish markets. The Chief of the agency's Fish and Wildlife Branch said that the present annual 3,000-ton harvest of "rough" fish from Tennessee Valley waters could be safely increased to 30,000 tons. "Our inventories of TVA reservoirs show a total 'rough'-fish population of about 61,000 tons. At present harvesting rates, much of this resource is going to waste."

He pointed out that there are about three pounds of "rough" fish in TVA lakes for every pound of game fish. "One of the best ways to increase the proportion of game fish is to make more of the desirable living space available to them by reducing the 'rough' fish," he said.

The nongame fish being harvested now are those desired by restaurants and fish markets--primarily catfish, drum, buffalofish, carp, and paddlefish. Other species such as gar, redhorse, and suckers have little or no demand in those markets and are not harvested. However, livestock and pet feed manufacturers and fertilizer producers offer a market for industrial fish if large enough quantities are available and dependable sources of supply are developed. Since this will require more efficient fishing gear, TVA and state agencies are investigating purse seines, trawls, trap nets, and other equipment that has not previously been used in the Tennessee Valley.

A commercial fisherman is testing a mile-long haul seine under contract arrangements with the Tennessee Game and Fish Commission. So far, it has been tried in Melton Hill, Watts Bar, and Douglas reservoirs. While the harvest has not been spectacular, results have been promising enough to warrant further testing.

Haul seines are expected to be more effective in Melton Hill when fish in that new impoundment have attained commercial size. There was a large spawn of young fish in Melton Hill during 1963, and areas of clean bottom suitable for haul seines were prepared and precisely located before the reservoir was filled. Commercial-size trawls may also be productive in these cleared areas; purse seines could be used in open water to capture schooling fish such as shad.

It was pointed out that commercial fishing is regulated by the fish and game agencies of the various states. The states specify the types of fishing gear that can be used. Gear is selective and can be designed to take commercial fish almost exclusively. The Chief of the TVA Fish and Wildlife Branch said "Instead of fighting commercial fishermen, the sportsmen ought to join them and advocate a larger commercial harvest. There is just so much good living space for fish, and 'rough' fish will take it over in many places if they aren't controlled. The best way to control them is through commercial fishing."

U. S. Foreign Trade

AIRBORNE IMPORTS OF FISHERY PRODUCTS:

October 1963: Airborne fishery imports into the United States in October 1963 were down 12.6 percent in quantity and 5.2 percent in value from those in the previous month. Total airborne imports during January-October 1963 were almost the same as those in the same period of 1962.

Raw headless shrimp continued to make up the bulk of the airborne shrimp imports--in October 1963, shipments consisted of 335,656 pounds of fresh or frozen raw headless, 7,250 pounds of frozen raw peeled, and 37,033 pounds of unclassified shrimp. Over 92 percent of the airborne shrimp arrivals in October entered through the U. S. Customs District of Florida. The remainder entered through the Customs Districts of New Orleans (La.), Laredo (Tex.), and Los Angeles (Calif.).

U. S.1/ Airborne Imports of Fishery Products, January-October 1963 with Comparative Data

Product and Origin2/	1963 October		1963 Jan.-Oct.		1962 Jan.-Oct.	
	Qty.3/	Value4/	Qty.3/	Value4/	Qty.3/	Value4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:						
Mexico	19.6	2.5	245.2	66.4	811.0	140.8
British Honduras	2.9	0.5	41.7	10.2	19.4	4.8
Honduras	-	-	16.5	4.3	0.4	0.1
Japan	-	-	2.0	8.2	-	-
United Kingdom	0.9	1.5	3.1	6.7	-	-
Iran	-	-	1.2	7.4	8.1	84.2
France	-	-	5.2	6.1	0.3	0.7
Rumania	-	-	-	-	1.3	11.3
Panama	-	-	0.9	0.4	7.8	1.3
U.S.S.R.	-	-	26.8	70.2	-	-
Canada	-	-	-	-	21.3	16.9
Costa Rica	-	-	-	-	5.6	0.9
Other countries	2.7	0.6	3.5	0.9	38.8	12.1
Total Fish	26.1	5.1	346.1	180.8	914.0	273.1
Shrimp:						
Guatemala	-	-	141.6	74.0	261.7	130.8
El Salvador	24.4	15.6	258.0	172.7	545.2	341.7
Honduras	-	-	99.8	52.3	25.2	18.6
Nicaragua	28.5	17.0	477.2	159.1	989.9	335.9
Costa Rica	72.7	36.1	582.5	278.9	498.8	213.2
Panama	91.8	53.7	1,442.5	776.2	1,653.5	919.4
Venezuela	162.5	78.5	4,161.9	1,956.1	2,884.9	1,557.3
Ecuador	-	-	111.6	39.4	12.2	3.4
France	-	-	2.6	0.9	-	-
Mexico	-	-	13.2	6.9	24.8	9.1
Netherlands Antilles	-	-	-	-	3.1	2.7
Argentina	-	-	-	-	10.5	4.8
Total Shrimp	379.9	200.9	7,290.9	3,516.5	6,909.8	3,536.9
Shellfish other than Shrimp:						
Mexico	5.4	4.1	97.6	57.6	68.3	45.1
British Honduras	63.1	54.1	309.9	253.7	206.6	121.0
El Salvador	-	-	5.0	3.6	6.2	4.6
Honduras	11.5	3.7	17.0	7.0	139.7	103.4
Nicaragua	18.6	11.0	164.5	100.0	1.2	0.6
Costa Rica	-	-	73.8	60.1	1.4	1.2
Jamaica	14.7	9.4	65.7	49.5	30.0	21.3
Netherlands Antilles	-	-	32.8	20.9	43.1	28.5
Colombia	-	-	8.0	21.7	1.8	5.1
Ecuador	-	-	2.2	1.8	1.6	1.2
Tunisia	-	-	0.8	0.9	-	-
Leeward and Windward Islands	-	-	1.6	0.5	24.0	9.1
British Guiana	-	-	1.7	0.3	-	-
Canada	-	-	213.3	109.2	224.1	91.1
Venezuela	-	-	13.7	6.0	22.3	13.6
Panama	0.4	0.4	3.1	2.6	1.0	1.0
Guatemala	-	-	-	-	11.5	5.7
Bahamas	-	-	5.3	5.2	17.8	6.5
Dominican Republic	3.1	2.9	25.3	23.8	25.6	23.7
Yugoslavia	-	-	1.2	0.7	-	-
Trinidad	-	-	-	-	2.3	1.0
Other countries	-	-	2.0	2.9	1.1	2.2
Total Shellfish (except shrimp)	116.8	85.6	1,044.5	728.0	829.6	485.9
Grand Total	522.8	291.6	8,681.5	4,425.3	8,653.4	4,295.9

1/Imports into Puerto Rico from foreign countries are considered to be United States imports and are included. But United States trade with Puerto Rico and with United States possessions and trade between United States possessions are not included.
2/When the country of origin is not known, the country of shipment is shown.
3/Gross weight of shipments, including the weight of containers, wrappings, crates, and moisture content.
4/F.o.b. point of shipment. Does not include U. S. import duties, air freight, or insurance.
Note: These data are included in the over-all import figures for total imports, i.e., these imports are not to be added to other import data published.

Airborne imports of shellfish other than shrimp in October consisted mainly of 105,974 pounds of fresh or frozen spiny lobster products. Almost 95 percent of the airborne imports of spiny lobsters entered through the Customs District of Florida. The remainder entered through the Customs Districts of New York (N.Y.), and South Carolina.

Fish fillets from Mexico were the leading finfish product imported by air in October.

The data as issued do not show the state of all products--fresh, frozen, or canned--but it is believed that the bulk of the airborne imports consists of fresh and frozen products. (United States Airborne General Imports of Merchandise, FT 380, October 1963, U.S. Bureau of Census.)

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September 1963: Airborne fishery imports into the United States in September 1963 were down 51.6 percent in quantity and 48.0 percent in value from those in the previous month. Total airborne imports during January-September 1963 showed an increase of 9.5 percent in quantity and 15.2 percent in value from

U. S.1/ Airborne Imports of Fishery Products, January-September 1963 with Comparative Data

Product and Origin2/	1963 September		1963 Jan.-Sept.		1962 Jan.-Sept.	
	Qty.3/	Value4/	Qty.3/	Value4/	Qty.3/	Value4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:						
Mexico	30.5	7.1	225.6	63.9	691.5	121.4
British Honduras	1.1	0.2	38.8	9.7	14.7	3.7
Honduras	-	-	16.5	4.3	-	-
Japan	-	-	2.0	8.2	-	-
United Kingdom	0.4	0.7	2.2	5.2	-	-
Iran	-	-	1.2	7.4	-	-
France	-	-	5.2	6.1	0.3	0.7
Rumania	-	-	-	-	1.3	11.3
Panama	-	-	0.9	0.4	7.8	1.3
U.S.S.R.	-	-	26.8	70.2	-	-
Canada	-	-	-	-	21.3	16.9
Costa Rica	-	-	-	-	5.6	0.9
Other countries	-	-	0.8	0.3	38.1	9.9
Total Fish	32.0	8.0	320.0	175.7	780.6	166.1
Shrimp:						
Guatemala	-	-	141.6	74.0	230.2	115.3
El Salvador	12.0	6.5	233.6	157.1	467.1	292.8
Honduras	-	-	99.8	52.3	-	-
Nicaragua	22.7	6.6	448.7	142.1	979.9	330.2
Costa Rica	54.8	25.6	509.8	242.8	327.7	138.8
Panama	133.0	75.3	1,350.7	722.5	1,423.2	776.3
Venezuela	269.1	128.3	3,999.4	1,877.6	2,482.4	1,343.4
Ecuador	-	-	111.6	39.4	12.2	3.4
France	-	-	2.6	0.9	-	-
Mexico	-	-	13.2	6.9	24.7	9.1
Netherlands Antilles	-	-	-	-	3.1	2.7
Total Shrimp	491.6	242.3	6,911.0	3,315.6	5,950.5	3,012.0
Shellfish other than Shrimp:						
Mexico	2.2	0.8	92.2	53.5	53.9	33.6
British Honduras	44.6	38.0	246.8	199.6	177.2	102.3
El Salvador	-	-	5.0	3.6	0.8	0.5
Honduras	3.6	2.3	5.5	3.3	113.0	80.7
Nicaragua	17.7	10.0	145.9	89.0	1.2	0.6
Costa Rica	-	-	73.8	60.1	1.4	1.2
Jamaica	-	-	51.0	40.1	30.0	21.3
Netherlands Antilles	-	-	32.8	20.9	31.2	19.9
Colombia	-	-	8.0	21.7	1.8	5.1
Ecuador	-	-	2.2	1.8	1.6	1.1
Tunisia	-	-	0.8	0.9	-	-
Leeward and Windward Islands	-	-	1.6	0.5	22.9	8.7
British Guiana	-	-	1.7	0.3	-	-
Canada	-	-	213.3	109.2	223.4	90.9
Venezuela	-	-	13.7	6.0	22.3	13.6
Panama	1.2	1.0	2.7	2.2	1.0	1.0
Guatemala	-	-	-	-	8.5	4.6
Bahamas	5.3	5.2	5.3	5.2	1.9	0.8
Dominican Republic	-	-	22.2	20.9	22.1	20.2
Yugoslavia	-	-	1.2	0.7	-	-
Trinidad	-	-	-	-	2.3	1.0
Other countries	-	-	2.0	2.9	0.5	1.5
Total Shellfish (except shrimp)	74.6	57.3	927.7	642.4	717.0	408.6
Grand Total	598.2	307.6	8,158.7	4,133.7	7,448.1	3,586.7

1/Imports into Puerto Rico from foreign countries are considered to be United States imports and are included. But United States trade with Puerto Rico and with United States possessions and trade between United States possessions are not included.
2/When the country of origin is not known, the country of shipment is shown.
3/Gross weight of shipments, including the weight of containers, wrappings, crates, and moisture content.
4/F.o.b. point of shipment. Does not include U. S. import duties, air freight, or insurance.
Note: These data are included in the over-all import figures for total imports, i.e., these imports are not to be added to other import data published.

arrivals in the same period of 1962, due mainly to larger shipments of shrimp and spiny lobsters.

Raw headless shrimp continued to make up the bulk of the airborne shrimp imports--in September 1963, shipments consisted of 470,027 pounds of fresh or frozen raw headless, 11,580 pounds of frozen raw peeled and deveined, and 9,952 pounds of unclassified shrimp. All of the airborne shrimp arrivals in September entered through the U. S. Customs District of Florida.

Airborne imports of shellfish other than shrimp in September consisted of 72,385 pounds of fresh or frozen spiny lobster products which entered through the Customs District of Florida, and 2,200 pounds of oysters which entered through the Customs District of Laredo (Tex.).

Airborne imports of finfish in September consisted of fresh or frozen fish and fish fillets from Mexico and British Honduras.

The data as issued do not show the state of all products--fresh, frozen, or canned--but it is believed that the bulk of the airborne imports consists of fresh and frozen products. (United States Airborne General Imports of Merchandise, FT 380, September 1963, U. S. Bureau of Census.)

* * * * *

IMPORTS OF CANNED TUNA UNDER QUOTA:

United States imports of tuna canned in brine during January 1-December 31, 1963, amounted to 56,413,638 pounds (about 2,686,364 std. cases), according to preliminary data compiled by the Bureau of Customs. This was 6,717,004 pounds (319,857 std. cases) less than the quota. But the imports in 1963 were 3.5 percent above the 54,483,996 pounds (about 2,594,476 std. cases) imported during 1962.

The quantity of tuna canned in brine which could be imported into the United States during the calendar year 1963 at the 12½-percent rate of duty was limited to 63,130,642 pounds (or about 3,006,221 std. cases of 48 7-oz. cans). Any imports in excess of the quota are dutiable at 25 percent ad valorem.

* * * * *

IMPORTS OF FISH MEAL AND SCRAP BY CUSTOMS DISTRICTS:

December 1963: U. S. imports of fish meal and scrap in December 1963 totaled 29,729 short tons, an increase of 71.2 percent from the 17,369 tons imported in the previous month, and up 56.7 percent from the 18,977 tons imported in December 1962.

About 89.3 percent of the fish meal and scrap imports in December 1963 entered through the Customs Districts of Maryland, Georgia, Mobile (Ala.), Galveston (Tex.), San Francisco (Calif.), Los Angeles (Calif.), and Washington.

U. S. Imports of Fish Meal and Scrap by Customs District, December 1963

Customs Districts	December 1963
	Short Tons
Maine & New Hampshire	500
Massachusetts	67
New York (N. Y.)	242
Philadelphia (Pa.)	222
Maryland	7,074
North Carolina	331
Georgia	3,351
Florida	548
Mobile (Ala.)	6,335
Sabine (Tex.)	557
Galveston (Tex.)	2,328
Los Angeles (Calif.)	1,187
San Francisco (Calif.)	3,129
Oregon	110
Washington	3,136
Duluth (Minn.) and Superior (Wis.)	550
Michigan	62
Total	29,729

Note: A list of the entry ports included within each Customs District is given in Schedule D, Code Classification of United States Customs Districts and Ports, which may be obtained free from the Foreign Trade Division, Bureau of the Census, U. S. Department of Commerce, Washington, D. C., 20233.

* * * * *

November 1963: United States imports of fish meal and scrap in November 1963 totaled 17,369 short tons, a decline of 44.8 percent from the 31,449 tons imported in the previous month, but a considerable increase from the 11,904 tons imported in November 1962.

About 80.4 percent of the fish meal and scrap imports in November 1963 entered through the Customs Districts of North Caro-

U. S. Imports of Fish Meal and Scrap by Customs Districts, November 1963

Customs Districts	November 1963
	Short Tons
Maine & New Hampshire	679
Massachusetts	72
New York (N. Y.)	129
Maryland	882
North Carolina	1,433
Mobile (Ala.)	1,314
New Orleans (La.)	1,540
Galveston (Tex.)	4,159
Los Angeles (Calif.)	330
San Francisco (Calif.)	3,154
Oregon	343
Washington	2,360
Hawaii	100
Dakota	210
Duluth (Minn.) and Superior (Wis.)	263
Michigan	401
Total	17,369

Note: A list of the entry ports included within each Customs District is given in Schedule D, Code Classification of United States Customs Districts and Ports, which may be obtained free from the Foreign Trade Division, Bureau of the Census, U. S. Department of Commerce, Washington, D. C., 20233.

lina, New Orleans (La.), Mobile (Ala.), Galveston (Tex.), San Francisco (Calif.), and Washington.

* * * * *

EDIBLE FISHERY PRODUCTS:

November 1963: Imports of processed edible fish and shellfish into the United States in November 1963 were down 2.3 percent in quantity and 6.9 percent in value from those in the previous month. Imports of most fish fillets were down in November and shipments of canned sardines also declined. There was a gain in imports of canned tuna in brine and canned oysters.

Compared with the same month in 1962, the imports in November 1963 were down 2.6 percent in quantity and 4.5 percent in value. In November 1963, there were lower imports of canned sardines in oil, haddock fillets, halibut fillets, swordfish fillets, and sea catfish (wolffish) fillets. The decline was almost offset by larger imports of ocean perch fillets, canned tuna in brine, and canned oysters.

In the first 11 months of 1963, imports were down 3.6 percent in quantity and 3.4 percent in value. Fluctuations in individual import items were much greater than the over-all totals indicate. Imports were down sharply in 1963 for canned tuna in brine, canned sardines in oil, and canned salmon. Imports were also down for flounder fillets, halibut fillets, sea catfish fillets, and swordfish fillets. On the other hand, there was an increase in imports of canned sardines not-in-oil (mostly from South Africa Republic), ocean perch fillets, blocks and slabs, canned crab meat from Japan, and yellow pike fillets.

U. S. Imports and Exports of Processed Edible Fishery Products, November 1963 with Comparisons

Item	QUANTITY				VALUE			
	Nov.		Jan.-Nov.		Nov.		Jan.-Nov.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(Millions of Lbs.)				(Millions of $)			
Fish & Shellfish:								
Imports[1]	51.8	53.2	492.4	510.7	14.8	15.5	143.7	148.8
Exports[2]	3.7	3.5	30.1	30.8	1.8	2.0	14.5	13.9

1/Includes only those fishery products classified by the U. S. Bureau of the Census as "Manufactured foodstuffs." Included are canned, smoked, and salted fishery products. The only fresh and frozen fishery products included are those involving substantial processing, i.e., fish blocks and slabs, fish fillets, and crab meat. Does not include fresh and frozen shrimp, lobsters, scallops, oysters, and whole fish (or fish processed only by removal of heads, viscera, or fins, but not otherwise processed).
2/Excludes fresh and frozen.

Exports of processed fish and shellfish from the United States in November 1963 were up 5.7 percent in quantity but down 14.3 percent in value from those in the previous month. The gain in volume was concentrated in the lower-priced canned mackerel and canned sardines while exports of the higher-priced canned salmon and canned shrimp declined.

Compared with the same month in 1962, November 1963 exports were up 5.7 percent in quantity but down 10.0 percent in value. Again, there were larger shipments of lower-priced canned fishery products but a drop in exports of the more expensive items.

Processed fish and shellfish exports in the first 11 months of 1963 were down 2.3 percent in quantity but up 4.3 percent in value from those in the same period in 1962. The decline in quantity was due mainly to lower shipments of canned sardines and a drop in exports of canned mackerel to the Congo Republic. There were increases in exports of the higher-priced canned salmon and canned shrimp, as well as larger shipments of canned squid. Although not covered in the table, exports of frozen shrimp were up sharply in the first 11 months of 1963 (increase mostly in exports to Japan), and there was a substantial increase in exports of frozen salmon.

* * * * *

October 1963: Imports of processed edible fish and shellfish into the United States in October 1963 were up 16.0 percent in quantity and 18.7 percent in value from those in the previous month. There was a general increase in imports of fish fillets as well as canned fishery products (with the exception of canned albacore tuna in brine).

Compared with the same month in 1962, imports in October 1963 were down 1.1 percent in quantity but up 3.9 percent in value.

In October 1963, there were larger imports of cod fillets, haddock fillets, yellow pike fil-

U. S. Imports and Exports of Processed Edible Fishery Products, October 1963 with Comparisons

Item	QUANTITY				VALUE			
	Oct.		Jan.-Oct.		Oct.		Jan.-Oct.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(Millions of Lbs.)				(Millions of $)			
Fish & Shellfish:								
Imports[1]	53.0	53.6	440.6	457.5	15.9	15.3	128.9	133.3
Exports[2]	3.5	3.6	26.4	27.3	2.1	2.0	12.7	11.9

Note: For explanation of footnotes see table for November.

lets, canned sardines in oil, and canned crab meat. The gain was offset by a drop in imports of halibut fillets, canned tuna in brine, and canned sardines not-in-oil.

In the first 10 months of 1963, imports were down 3.7 percent in quantity and 3.3 percent in value. Fluctuations in individual import items were much greater than the overall totals indicate. Imports were down sharply in 1963 for canned tuna in brine, canned sardines in oil, and canned salmon. On the other hand, there was a large increase in imports of canned sardines not-in-oil (mostly from South Africa Republic); fish blocks and slabs, and canned crab meat from Japan.

Exports of processed fish and shellfish from the United States in October 1963 were down 2.8 percent in quantity but up 5.0 percent in value from those in the same month of 1962. Lower shipments of canned squid and canned sardines were about offset by larger exports of canned salmon, canned shrimp, and canned mackerel.

Processed fish and shellfish exports in the first 10 months of 1963 were down 3.3 percent in quantity but up 6.7 percent in value from those in the same period in 1962. The decline in quantity was due mainly to lower shipments of canned sardines and a drop in exports of canned mackerel to the Congo Republic. There were increases in exports of the higher-priced canned salmon and canned shrimp, as well as larger shipments of canned squid. Although not covered in the table, exports of frozen shrimp were up sharply in the first 10 months of 1963 (increase mostly in exports to Japan), and there was a substantial increase in exports of frozen salmon.

Notes: (1) The data shown above were previously included in news releases on "U. S. Imports and Exports of Edible Fishery Products." In the past, data showing "U. S. Imports of Edible Fishery Products" summarized both manufactured and crude products. At present, a monthly summary of U. S. imports of crude or nonprocessed fishery products is not available, therefore only imports of manufactured or processed edible fishery products are reported above. The above import data are, therefore, not comparable to previous reports of "U. S. Imports of Edible Fishery Products."

The export data shown above are comparable to previous data in "U. S. Exports of Edible Fishery Products." The export data in this series of articles have always been limited to manufactured or processed products.

(2) See Commercial Fisheries Review, Jan. 1964 p. 34, Nov. 1963 p. 49.

U. S. Vessels

NEW RESEARCH VESSEL COMMISSIONED FOR BUREAU OF COMMERCIAL FISHERIES: The Townsend Cromwell, the new oceanographic and fisheries research vessel of the U. S. Bureau of Commercial Fisheries, was commissioned January 25, 1964, at Honolulu, Hawaii. The new vessel is named in honor of an oceanographer who discovered in 1951 a major Pacific Ocean current which now carries his name. The Townsend Cromwell is designed to provide the range, seaworthiness, and laboratory facilities needed for applying a variety of research techniques to the study of fishery resources and their oceanographic environment over a vast area of the central Pacific. The vessel was built in Louisiana at a cost of $1,700,000.

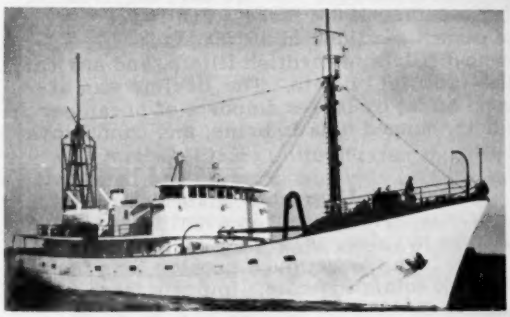


Figure 1 - Townsend Cromwell viewed from the side.

In appearance, the Townsend Cromwell, a 158-foot vessel of 565 gross tons, is similar to a modern distant-water trawler. Its fishing capabilities emphasize midwater trawling and long-line fishing, but it can be adapted to other types of net and line fishing.

Hydrographic, biological, and chemical laboratories are centrally located on the main deck in a position of minimum motion near the overside work platform.

To maintain the slow speeds necessary for plankton investigations and gain the maneuverability needed at oceanographic stations, twin screws, variable pitch propellers, and twin spade rudders have been installed. Two 400-horsepower Diesel engines drive the vessel at a cruising speed of 12 knots. Electric power is supplied by three 60-kilowatt Diesel generators. The vessel has a range of about 10,000 miles and will be able to cruise up to 2 months without refueling. Her complement of 25 men will include 7 scientists.

The vessel is designed to enable scientists to continue their work during rough weather. There are anti-roll features and a bulbous nose under the bow which will dampen pitching from fore to aft. The bulbous nose also will serve as a viewing chamber to permit observations and photographs of marine specimens underwater. The high transparency of the tropical Pacific in daylight permits visibility for several hundred feet.

Figure 2 - Townsend Cromwell viewed from the stem.

The Hawaiian Area Director of the U.S. Bureau of Commercial Fisheries said that the vessel will engage in oceanographic studies and in experimental fishing to learn more of the basic processes in the ocean and to find new areas where fish may be caught, particularly tuna.

Beginning in the early summer of 1965, the Bureau of Commercial Fisheries will use the vessel to participate with other Government agencies in the Pacific Trade Wind Zone Oceanographic Program, a planned two-year cooperative study in a rectangular area of the Pacific roughly the size of the United States. The study is expected to provide information on interactions between the atmosphere and the ocean that affect our climate and even the distribution of fish. One phase of the research will try to determine how weather is affected when the ocean absorbs heat in one part of the world and transports it to another.

Wholesale Prices

EDIBLE FISH AND SHELLFISH, JANUARY 1964:

The wholesale price index for edible fish and shellfish (fresh, frozen, and canned) rose steadily each month from November 1963 to January 1964. At 110.0 percent of the 1957-59 average, the index in January 1964 was up 2.3 percent from the previous month. Compared with January 1963, prices this January were down substantially for nearly all items with the over-all index down 9.8 percent.

The subgroup index for drawn, dressed, or whole finfish was up 1.8 percent from December to January 1964, but was lower than January a year earlier by 15.1 percent. Prices at Boston for ex-vessel large haddock (up 6.0 percent) moved up from December to January because of lighter landings, but were 13.4 percent below January 1963. A substantial increase from the previous month in prices for fresh Lake Superior whitefish (up 13.4 percent) at Chicago was partly offset by lower prices for Great Lakes round yellow pike at New York City. Prices at New York City for frozen dressed western halibut and king salmon this January were the same as in the previous month but were considerably lower than in January 1963 because of large stocks in cold storage.

Higher January 1964 prices for all processed fresh fish and shellfish products were responsible for a 3.5-percent increase from the previous month in that subgroup index. Prices for South Atlantic fresh shrimp at New York City were up 5.5 percent from December to January, but down 20.8 percent from January 1963. Fresh small haddock fillets at Boston were higher-priced (up 2.6 percent) this January than the previous month, and were up 3.5 percent from the same month a year earlier. Compared with January 1963, the subgroup index this January was 11.5-percent lower mainly because of sharply lower fresh shrimp prices and some decline in prices for standard shucked oysters at Norfolk.

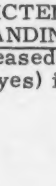
Wholesale Average Prices and Indexes for Edible Fish and Shellfish, January 1964 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Jan. 1964	Dec. 1963	Jan. 1964	Dec. 1963	Nov. 1963	Jan. 1963
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					110.0	107.5	106.1	121.9
Fresh & Frozen Fishery Products:					113.0	110.5	109.0	130.0
Drawn, Dressed, or Whole Finfish:					116.5	114.4	117.0	137.2
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.18	.17	141.0	133.0	124.7	162.9
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.33	.33	96.1	96.1	97.1	128.1
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.85	.85	118.4	2/118.4	124.0	134.5
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.47	.41	69.4	61.2	83.6	106.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.49	.51	80.2	83.5	75.3	88.5
Processed, Fresh (Fish & Shellfish):					115.4	111.5	107.2	130.4
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.59	.57	142.0	2/138.4	131.1	137.2
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.86	.82	100.8	95.5	85.0	127.2
Oysters, shucked, standards	Norfolk	gal.	7.63	7.50	128.6	126.5	130.7	132.8
Processed, Frozen (Fish & Shellfish):					102.8	101.3	98.6	117.5
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.39	98.9	98.9	98.9	100.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.39	.40	114.3	115.8	111.4	107.0
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.34	.35	117.5	121.0	119.2	117.5
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.81	.78	95.5	91.9	89.5	123.9
Canned Fishery Products:					104.7	102.5	101.2	108.0
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	23.50	23.50	102.4	102.4	101.3	107.9
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.63	11.06	103.3	98.2	96.6	104.4
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	5.75	5.75	97.5	97.5	97.5	3/100.0
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.96	8.96	114.9	114.9	113.3	119.4

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.
2/Revised.
3/New product replaced California canned sardines starting December 1962; entered wholesale price index at 100 under revised procedures of Bureau of Labor Statistics.

The subgroup index for processed frozen fish and shellfish rose 1.5 percent from December to January due to higher prices at Chicago for frozen shrimp (wholesale price up 3 cents a pound). Prices for frozen haddock and ocean perch fillets were slightly lower than in December, and flounder fillet prices were unchanged from those of the previous month. The January 1964 subgroup index was down 12.5 percent from the same month a year earlier largely because of lower frozen shrimp prices. But prices for frozen haddock fillets this January were up 6.8 percent from January 1963.

Although prices for most canned fish products were relatively unchanged from December to January, those for canned tuna moved up 5.2 percent and were solely responsible for a 2.1-percent increase in that subgroup index for January 1964. The California canned tuna pack for 1963 of 9 million cases was about 1.5 million cases below the 1962 pack. As compared with January 1963, prices this January were lower for all canned fish and that subgroup index was down 3.1 percent.



Yellow Pike

INCREASE PREDICTED OF COMMERCIAL LANDINGS IN LAKE ERIE:

A greatly increased commercial catch of yellow pike (walleyes) in western Lake Erie, based on fish developing from a highly successful spawning in the spring of 1962, has been predicted by Ontario's Department of Lands and Forests, Canada. This should mean that sport fishing for that species will also be much better. Down from record-high landings in 1956 of 9,275,000 pounds to a record low of 269,000 pounds in 1961, the catch prediction for 1964 is between 1 and $1\frac{1}{4}$ million pounds.

An abundance of young yellow pike resulting from the unusually successful 1962 hatch, coupled with much faster growth, led to the prediction. The Ontario Government agency noted that an accelerated rate of growth also seems to be matched by an accelerated development of sexual activity. As a result, males appear likely to reach breeding maturity at 2 years of age and females at 3 years, whereas the more usual ages are 3 for males and 4 for females.

International

EUROPEAN FREE TRADE ASSOCIATION

INDUSTRIAL TARIFFS REDUCED ANOTHER 10 PERCENT:

On December 31, 1963, the European Free Trade Association (EFTA) announced a further cut of 10 percent in the level of tariffs on industrial goods traded between the 7 member countries of the Association (Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom) and between them and Finland, as associate member of EFTA. But fishery and agricultural products are not included in the industrial goods category. This brings the 1964 level of industrial tariffs within EFTA to 40 percent of what it was on January 1, 1960. Successive accelerations of the timetable for the reduction of industrial tariffs, including new decisions of the EFTA Council of Ministers in Lisbon in May 1963, have brought EFTA to the 40 percent level 2 years earlier than the original timetable laid down in the 1960 Stockholm Convention.

The 1963 Lisbon meeting also ruled that the industrial tariffs within EFTA should be reduced to zero by December 31, 1966, three years earlier than the original timetable. (European Free Trade Association Reporter, January 23, 1964.)

Note: See Commercial Fisheries Review, October 1963 p. 39.

FISHING LIMITS

MODIFIED 12-MILE FISHING LIMIT PROPOSED AT EUROPEAN FISHERIES CONFERENCE IN LONDON:

A majority of the 16 nations, attending the European Fisheries Conference in London during January 1964, approved a draft agreement calling for a modified 12-mile offshore fishing limit. The draft agreement provides for a 6-mile exclusive fishery limit and an additional 6-mile belt in which countries with "traditional fishing rights" will be permitted to continue to fish.

A conference communique did not name the countries opposed to the agreement.

Countries attending the conference were Austria, Belgium, Denmark, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

The conference expected to reconvene on February 16. (European Free Trade Association Reporter, January 23, 1964.

Note: See Commercial Fisheries Review, February 1964 p. 59.

FISH MEAL

PRODUCTION AND EXPORTS FOR SELECTED COUNTRIES, JANUARY-OCTOBER 1963:

Member countries of the Fish Meal Exporters' Organization (FEO) account for about 90 percent of world exports of fish meal. The FEO countries are Angola, Iceland, Norway, Peru, and South Africa/South-West Africa. Exports of fish meal by FEO countries during January-October 1963 were up 10.9 percent and their production was up 8.1 percent in quantity from that in the same period of the previous year.

Table 1 - Exports of Fish Meal by Member Countries of the FEO, January-October 1963

Country	July		Aug.		Sept.		Oct.		Jan.-Oct.	
	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Metric Tons)									
Angola	0.8	1.1	1.5	3.3	1.5	1.4	3.6	4.4	21.3	25.1
Iceland	7.6	2.9	5.7	10.9	6.1	4.3	10.2	2.4	66.8	58.9
Norway	3.9	3.3	5.4	4.2	5.6	3.6	12.1	6.8	68.6	41.0
Peru	110.3	95.4	83.1	88.9	73.4	56.4	83.3	63.3	964.2	863.9
So. Afr.(inc. S.W. Africa	17.5	16.9	15.6	14.7	20.2	10.2	41.0	10.3	166.7	172.1
Total	140.1	119.6	111.3	122.0	106.8	75.9	150.2	87.2	1,287.6	1,161.0

Table 2 - Production of Fish Meal by Member Countries of the FEO, January-October 1963

Country	July		Aug.		Sept.		Oct.		Jan.-Oct.	
	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Metric Tons)									
Angola	1.1	1.2	2.0	3.1	1.3	1.2	3.6	4.8	21.0	24.7
Iceland	6.3	19.1	18.2	29.2	13.3	11.8	0.9	0.4	78.3	92.9
Norway	25.3	36.5	18.3	18.7	14.1	9.4	7.8	11.9	110.0	107.1
Peru	39.2	65.7	38.0	52.4	47.7	64.5	76.8	92.3	903.4	819.3
So. Afr. (inc. S.W. Africa)	29.2	22.1	19.3	11.7	20.8	6.5	17.0	2.6	233.2	200.5
Total	101.1	144.6	95.8	115.1	97.2	93.4	106.1	112.0	1,345.9	1,244.5

International (Contd.):

During the first 10 months of 1963, Peru accounted for 74.9 percent of total fish meal exports by FEO countries, followed by South Africa with 12.9 percent, Norway with 5.3 percent, Iceland with 5.2 percent, and Angola with 1.7 percent. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, January 22, 1964.)

FOOD AND AGRICULTURE ORGANIZATION

1962 WORLD FISH CATCH BY SPECIES GROUPS:

The world fish catch in 1962 was 8.6 percent greater than in the previous year, according to The Yearbook of Fisheries Statistics published by the Food and Agriculture Organization (FAO) of the United Nations. Herring, sardine, and anchovy-type fish formed the largest group taken in 1962. The catch of that group was up 16.4 percent from 1961. The increase was a major factor in boosting world fish production to a record level in 1962. The only important species groups taken in lesser quantity in 1962 were flatfish (down 7.6 percent) and salmon, trout, smelt, etc. (down 28.6 percent).

World Commercial Fish Catch[1/] by Groups of Species, 1961-1962

Groups of Species	1962	1961
	(Million Metric Tons)	
Fresh-water fish	4.67	4.39
Salmon, trout, smelt, etc.	0.55	0.77
Flounder, halibut, sole, and other flatfish	1.21	1.31
Cod, hake, haddock, etc.	5.51	5.06
Herring, sardine, anchovy, etc.	14.66	12.59
Tuna, bonito, mackerel, etc.	2.38	2.11
Mullet, jacks, seabass, etc.	4.27	4.03
Sharks, rays, etc.	0.37	0.34
Unsorted and unidentified fish	6.95	6.68
Crustaceans	0.96	0.88
Molluscs	2.53	2.29
Aquatic plants	0.66	0.71
Total	44.72	41.16

1/Live weight or whole fresh weight basis.

* * * * *

WORLD TUNA-LIKE FISH CATCH, 1962:

A record world catch of 2,380,000 metric tons of tuna, bonito, mackerel, and other tuna-like fish was made during 1962, according to The Yearbook of Fisheries Statistics of the Food and Agriculture Organization (FAO) of the United Nations. The 1962 catch of those fish was up 13 percent from the previous year. The tuna, bonito, and mackerel group represented 5.3 percent of the 1962 world fish catch of 44.72 million tons.

Japan was the leading producer of tuna and tuna-like fish in 1962 with landings of 1,167,800 tons, just under one-half the world total. Thus Japan improved on her own previous tuna-like catch record of 1,036,700 tons in 1961.

The United States was second with a 1962 tuna catch of 169,700 tons. That was a drop of 9,300 tons from the 179,000 tons caught in 1961.

Peru came third with a catch of 151,500 tons, topping the previous Peruvian high of 146,500 tons caught in 1961. Spain was fourth with 72,300 tons--29,400 tons above her 1961 catch, but still slightly below her record tuna catch of 73,500 tons in 1958.

The only other countries to catch over 50,000 tons of tuna or tuna-like fish in 1962 were China (Taiwan) with 65,700 tons, and India with 62,900.

* * * * *

DIRECTOR-GENERAL RE-ELECTED AT NOVEMBER 1963 CONFERENCE:

B. R. Sen of India was re-elected on November 27, 1963, to serve as Director-General of the Food and Agriculture Organization (FAO) until the end of 1967. He was first elected Director-General in September 1956, following the resignation of Dr. Philip Cardon of the United States and was then re-elected in 1959.

D. R. Sen.

In thanking the FAO delegates, Sen called FAO an "indispensable forum" for the solution of some of the world's most urgent problems and called upon the Organization's member nations to help him in preserving that forum's strength.

Eight new countries were admitted as members or associate members of FAO at the Conference held the latter part of 1963. Algeria, Burundi, Rwanda, Trinidad and Tobago, and Uganda were elected members and Kenya, Malta, and Zanzibar were admitted as associate members. FAO now has 112 members and associate members. (An associate member differs from a full member only in that it does not have a vote at Conference sessions.)

International (Contd.):

The Conference also voted to elect Georges Haraoui of Lebanon as Independent Chairman of the 27-Nation Council which governs FAO between biennial sessions of its Conference. He replaces Louis Maire of Switzerland who has served in the post since 1959. Haraoui is a member of the Lebanese Parliament and a former Cabinet Minister.

The FAO Conference decided that the number of seats on the FAO Council would be increased to either 30 or 31 from the present 27 member seats. The Conference, however, requested the Council to make recommendations as to whether the increase in seats shall be 3 or 4, to which regions the new seats should be allocated, and wording to change the FAO Constitution in order to provide for the increase. The Council's recommendations will be submitted for adoption to the 13th Session of the Conference, which will be held in 1965.

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FISHERIES DEVELOPMENTS IN BAY OF BENGAL, ARABIAN SEA, AND PERSIAN GULF PROPOSED:

The Food and Agriculture Organization (FAO) Conference asked the Director-General to help member governments in preparing joint projects to exploit marine resources in the Bay of Bengal, the Arabian Sea, and the Persian Gulf. The Conference's Commission Two asked FAO's help in getting financial and other help from the United Nations (UN) Special Fund and from other agencies in executing the projects.

The Government of Pakistan, jointly with other governments, had proposed two such projects, one for fishing in the seas adjoining the east coasts of Pakistan and Burma, and the other for the Arabian Sea, the Persian Gulf, and other waters adjoining the coasts of Iran, Pakistan, Iraq, Kuwait, Saudi Arabia, and other countries. All those countries supported the proposal.

A resolution adopted by the Commission asked the Director-General to give urgent assistance to those countries in the joint projects, pending the help which might be obtained from the UN Special Fund and other agencies.

The resolution says there was urgent need "for comprehensive projects to be carried out by the governments . . . severally and jointly with the help of FAO and the financial assistance of the UN Special Fund and/or other aid resources... ." The projects would include oceanographic and biological surveys and exploration of fishery resources; economic and marketing surveys of fish and fish products; measures to improve fishing boats, gear and nets, and work on the design and location of fish harbors, jetties, cold-storage and processing plants. (FAO, Rome, December 3, 1963.)

SALMON

INTERMINGLING OF UNITED STATES AND CANADIAN PACIFIC SALMON UNDER STUDY:

An informal committee to study king and silver salmon along the Pacific coast was formed after a meeting during November 1963 in Vancouver, British Columbia, between Canadian and United States fisheries officials. The study was considered desirable because United States and Canadian stocks of those species are harvested in many areas by commercial and sport fishermen of both countries. There has also been a general decline in king salmon catches during the past few years.

The committee will first review available information on the migratory movements of king and silver salmon. This will be done to determine where and when fish bound for United States and Canadian streams intermingle and the extent of such intermingling in areas where fishing takes place. The review can provide the basis for joint research programs wherever it is indicated additional information is needed.

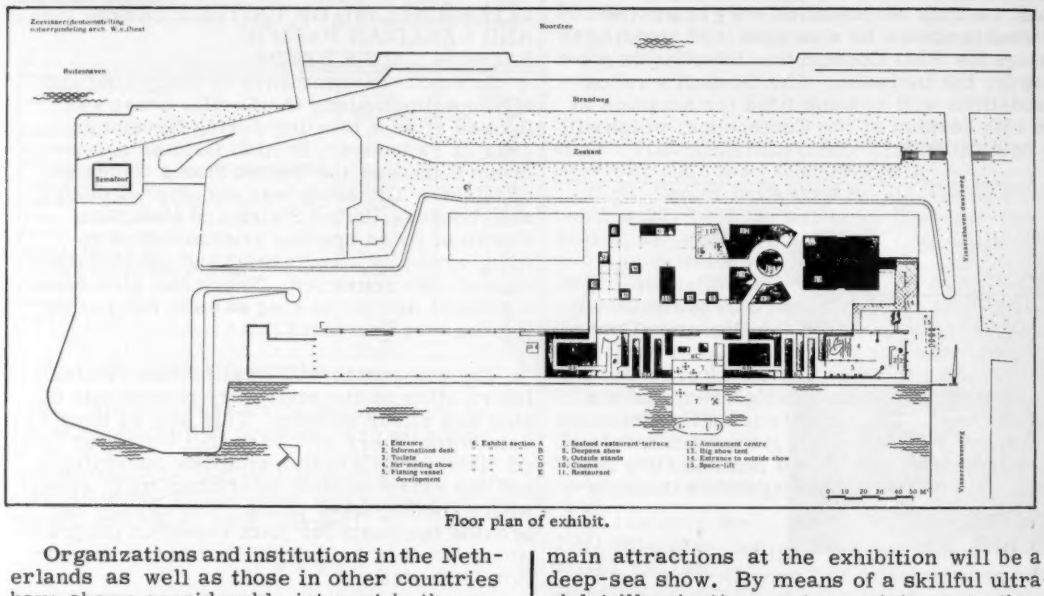
The Canadian members of the committee are the Director of the Nanaimo (B. C.) Biological Station of the Fisheries Research Board of Canada, and the Pacific Area Director of the Canadian Department of Fisheries. United States members are the Pacific Northwest Regional Director of the U. S. Bureau of Commercial Fisheries, and the Director of the Pacific Marine Fisheries Commission. A technical working group is being appointed by each country to assist the committee. (Canadian Department of Fisheries, Trade News, November-December 1963.)

International (Contd.):

INTERNATIONAL FISHERIES EXHIBITION PLANNED FOR SCHEVENINGEN IN THE NETHERLANDS

The international fisheries exhibition described as Scheveningen 64, "Rijk is de Zee" (Rich is the Sea), will be held July 17-29, 1964, at Scheveningen on the North Sea, which is essentially a part of The Hague in the Netherlands. Scheveningen is both a fishing port and seaside resort area and the exhibition is to be held in and around the new fish auction rooms of that port.

The new fish auction hall along the first inner harbor at Scheveningen, Holland.



Floor plan of exhibit.

Organizations and institutions in the Netherlands as well as those in other countries have shown considerable interest in the exhibition and discussions have been held with many fishery nations on participation and contributions.

Plans call for the exhibition to be a gala event including a completely decorated first inner harbor as well as fully decorated fishing vessels and other craft calling at the port. All of the fishing ports in the Netherlands are expected to contribute to the event.

A terrace is planned to be built over part of the harbor adjacent to a special seafood restaurant overlooking the sea. One of the main attractions at the exhibition will be a deep-sea show. By means of a skillful ultraviolet illumination system, visitors to the show will have the impression that they are walking below sea level.

Note: For additonal information write: M. Van de Meeberg, Adviesbureau voor Public Relations, Lange Voorhout 16, 's-Gravenhage, Netherlands.

WHALING

FLEET COMPOSITION OF 1963/64 ANTARCTIC WHALING SEASON:

A total of 16 factoryships were used during the 1963/64 Antarctic whaling season. This is one factoryship less than in the 1962/63 season as the British vessel Southern Harvest, which was sold to Japan during

International (Contd.):

1963, did not participate in the 1963/64 season. With the Japanese purchase of the Southern Harvest in 1963, the United Kingdom became a nonwhaling nation in the latest Antarctic whaling expedition. The Southern Harvest was a sistership of the Southern Venturer which was purchased jointly from the British in June 1962 by Japan's three whaling companies in conjunction with another Japanese fishing firm.

No definite information is available at this time on how many catcher vessels the four Soviet factoryships are using. If the estimate is used of 70 Soviet catcher vessels (the same as calculated for the 1962/63 season), the 16 factoryships operated by the four whaling nations participating in this season's expedition would be using a total of 192 catcher vessels.

Antarctic Whaling Fleets, 1963/64 Season With Comparisons						
Country	1963/64		1962/63		1961/62	
	Factoryships	Catcher Vessels	Factoryships	Catcher Vessels	Factoryships	Catcher Vessels
Norway	4	33	4	32	7	71
United Kingdom	-	-	1	9	2	22
Netherlands	1	11	1	11	1	15
Japan	7	78	7	79	7	85
U. S. S. R.	4	1/70	4	70	4	67
Total	16	192	17	201	21	260

1/Estimated.

The two land stations on South Georgia--Grytviken and Leith Harbour--were leased to the Japanese whaling companies for the 1963/64 season. Grytviken, which was activated from October 1 to November 30, 1963, during the previous season, is using 8 catcher vessels. Leith Harbour, which was to operate during the whole permissible catching season (October 1, 1963 to March 31, 1964), was to use 7 catcher vessels, except during the period from October 31, 1963 to March 1, 1964, when possibly only 5 catcher vessels might be used.

Of the 192 catcher vessels used during the 1963/64 season, 4 were built before 1940, 50 during 1940-49, 95 during 1950-59, and 43 during 1960-62. (Norwegian Whaling Gazette, December 1963.)

Note: See Commercial Fisheries Review, October 1963 p. 63; September 1963 p. 84; August 1963 p. 78.

Aden

INTERNATIONAL INTEREST IN GULF OF ADEN FISHERIES:

During June through October 1963, international fishing activities in the Gulf of Aden and southern Red Sea waters showed a great increase over previous years. By far the greatest interest was shown by the Soviets, although the British, Americans, and Italians did some survey work.

In mid-1963, a small Soviet fleet of purse-seine vessels supported by a carrier vessel and a refrigerated mothership operated in the central Gulf of Aden along the north coast of Somalia, and also adjacent to Aden. Yellowfin tuna, skipjack tuna, and large jack mackerel were the main catch of the Soviet purse seiners. They claimed to have averaged about 15 good fishing days per month and a catch of 10 metric tons per day per vessel.

In the fall of 1963, tuna schools began to swim deep and below the reach of the purse-seine nets. Since the Soviet vessels were not equipped for long-line operations, they returned to their Black Sea ports. With suitable alterations to their purse-seine equipment, they are expected to return to the Aden area in May 1964.

Two Soviet stern trawlers operated along the coast of the eastern Aden Protectorate in the summer of 1963. The vessels, the Alushta and the Shota Rustaveli, claimed excellent results. Catches were said to have reached 30 tons per day per vessel, and 1 of the 2 claimed to have taken 400 tons in 20 days. The fish taken by the trawlers were sold mainly in Colombo, Ceylon. The vessels used Aden as a source of supplies and fuel.

It has been reported that an Egyptian delegation visiting Moscow in late 1963, attempted to negotiate arrangements for Soviet fishing

Aden (Contd.):

vessels in the Indian Ocean and Red Sea to take their catches directly to Port Suez for sale.

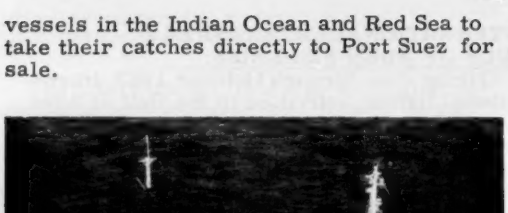


Fig. 1 - Soviet research vessel Konstantin Boldyrev.

Soviet research vessels, including the Konstantin Boldyrev and Vladimir Vorobjov, have been active in the Gulf of Aden and the Red Sea as far as the Sudanese coast. They have indicated that Yemen coastal waters may have a rich fisheries potential.

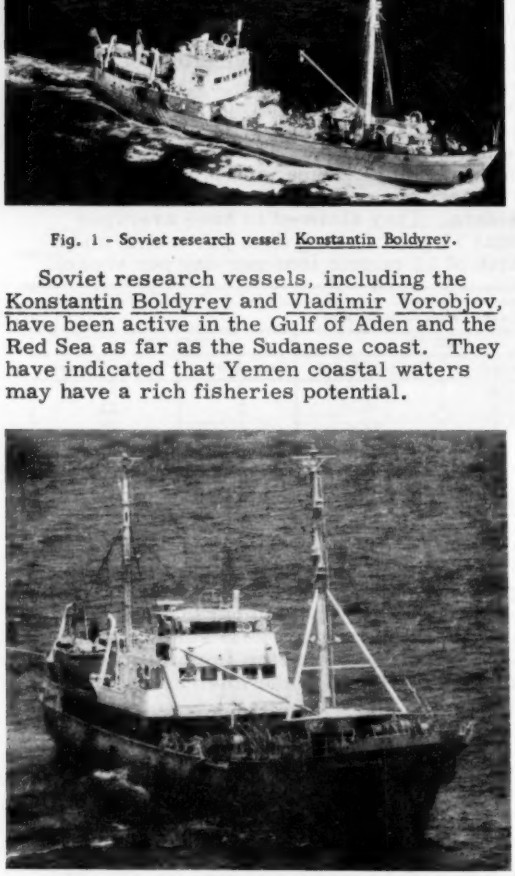


Fig. 2 - Soviet research vessel Vladimir Vorobjov.

Genepesca VII, a privately-owned Italian fishing and survey vessel, has carried out tuna investigations along the Somali coast. During the summer of 1963, the Italian vessel's highest tuna catch rate with long lines was 50 percent with a consistent catch rate of 15 to 20 percent as far west as Berbera.

Discovery II, a British research vessel, visited Aden following a survey expedition in the north Indian Ocean. In early October 1963, the United States research vessel Anton Bruun was in Aden before continuing her researches in the Gulf of Aden and northern reaches of the Indian Ocean adjacent to Muscat and Oman. Partly as a result of those and other visits which are a part of the International Indian Ocean Expedition, the Fisheries Department of Aden expects to begin tagging yellowfin tuna in 1964. This should reveal information on the movements of the different age groups of tuna in the Gulf of Aden. (United States Consulate, Aden, December 12, 1963.)

Note: See Commercial Fisheries Review, February 1963 p. 66, May 1963 p. 56.

Angola

FISH CANNERY PLANNED FOR ANGOLA BY SOUTH AFRICAN INTERESTS:

A fish cannery is planned in Angola by South African interests. A South African company with South African and South-West African directors and capital has bought control of two fish factories in Angola, according to the The Windhoek Advertiser of December 23, 1963, and the Johannesburg Sunday Times of December 22, 1963.

The new joint South Africa-Angola company has 2 South Africans and 5 South-West Africans as directors. The group states that the two Angolan factories are at present worth R1,500,000 (US$2,115,000). A development program for the factories was discussed at a directors' meeting in Cape Town. At present the factories have no facilities for canning, but are confined to the production of fish meal and fish oil. One of the factories is now producing 200 tons of fish meal per day, which has sold for R80 ($122) a short ton, and fish oil from the same plant is said to have been sold at R200 ($282) a ton.

A spokesman for the group announced:

"In addition to establishing the first fish-canning factory in Angola, we will fly fresh rock lobster, crab, and prawns to Johannesburg via Luanda... . The authorities in Luanda will not restrict us in any way."

There is now a Luanda-Windhoek weekly air service operated by the Portuguese airline DTA, and South African Airways' own Boeing 707's now land in Luanda en route to

Angola (Contd.):

and from Europe "by sea." It is the introduction of the latter service which makes possible the export of fresh shellfish from Angola to the Johannesburg market. (United States Consulate, Cape Town, December 31, 1963.)

Australia

FISHERIES LANDINGS, 1962/63:

Australian fisheries landings in fiscal year 1962/63 (July 1962-June 1963) were up 6.4 percent in quantity and 3.6 percent in value from those in the previous fiscal year. With the exception of crab, there was some gain in landings of all leading fishery items. Shrimp landings showed the greatest gain with an increase of 35.3 percent in quantity and 42.2 percent in value due to heavier production in New South Wales, Queensland, and Western Australia. Landings of spiny lobsters were up 5.9 percent in quantity but down 4.2 percent in value.

New South Wales was Australia's leading producer of shrimp, finfish, and oysters in 1962/63. Western Australia was the leading producer of spiny lobsters, and also made rapid gains in shrimp production during 1962/63. (Australian Fisheries Newsletter, December 1963.)

Note: See Commercial Fisheries Review, March 1963 p. 45.

Canada

FISH CATCH, 1962:

Canada's fish catch in 1962 reached an all-time high of 1,115,100 metric tons with a record ex-vessel value of C$128,730,000 (US$119,000,000), according to The Yearbook of Fisheries Statistics of the Food and Agriculture Organization (FAO) of the United Nations. The 1962 catch topped by 9,600 tons the previous Canadian high of 1,105,500 tons caught in 1956. It was 95,500 tons above the 1961 Canadian catch of 1,019,600 tons valued at C$110,639,000 (US$102,000,000).

Table 1 - Australia's Landings[1] and Ex-Vessel Value of Fishery Products, 1961/62 and 1962/63[2]

Species	1962/63			1961/62		
	1,000 Lbs.	A£1,000	US$1,000	1,000 Lbs.	A£1,000	US$1,000
Finfish	80,587	6,122	13,713	78,526	6,075	13,608
Spiny lobster	30,532	5,570	12,477	28,821	5,815	13,026
Shrimp	12,616	1,906	4,269	9,322	1,340	3,002
Crab	843	82	184	875	79	177
Oysters	13,028	1,123	2,516	12,613	1,014	2,271
Scallops	6,498	245	549	5,172	193	432
Other shellfish	987	38	85	1,030	45	101
Total[3]	145,091	15,086	33,793	136,359	14,561	32,617

1/Landed weight.
2/Preliminary.
3/Includes landings in Australia's Northern Territory, but excludes fresh-water fish landings in Queensland.
Note: Australian pounds converted to US$ at rate of A£1.00 equal US$2.240.

Table 2 - Australia's Fishery Landings by States, 1961/62 and 1962/63[1]

Species	New South Whales		Victoria		Queensland		South Australia		Western Australia		Tasmania	
	1962/63	1961/62	1962/63	1961/62	1962/63	1961/62	1962/63	1961/62	1962/63	1961/62	1962/63	1961/62
	(1,000 Pounds)											
Finfish	31,598	27,071	12,011	12,259	2/ 9,041	2/ 8,834	16,137	15,059	8,017	8,895	3,467	6,182
Spiny lobster	498	398	1,080	1,138	31	58	4,650	4,025	20,512	19,238	3,761	3,964
Shrimp	6,623	4,678	4	4	4,971	4,400	-	-	1,017	239	-	-
Crab	228	190	-	-	571	625	-	-	36	59	-	-
Oysters	12,604	12,204	63	65	330	323	-	-	28	10	1	1
Scallops	-	-	-	-	627	400	-	-	3/	-	5,871	4,772
Other shellfish	-	-	860	899	119	117	-	-	8	14	-	-
Total	51,551	44,541	14,018	14,365	15,690	14,757	20,787	19,084	29,618	28,455	13,100	14,919

1/Preliminary.
2/Exclusive of fresh-water fish landings in Queensland.
3/Less than 500 pounds.
Note: Total Australian fisheries landings shown in table 1 are greater than the combined total landings in the individual states which do not include landings in the Northern Territory.

Canada (Contd.):

Canada's catch represented 2.5 percent of the 1962 world catch of 44.72 million tons, and ranked Canada number seven among the major fishing nations, behind Japan, Peru, Mainland China, the Soviet Union, the United States, and Norway.

About 850,000 tons of the 1962 Canadian catch was used for human food in fresh, frozen, cured, or canned form. The remainder was processed into fish meal and oil to be used for animal feed and miscellaneous purposes.

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FEDERAL-PROVINCIAL CONFERENCE ON FISHERIES DEVELOPMENT:

The first Canadian Federal-Provincial Ministerial Conference on Fisheries was held in Ottawa, January 20-24, 1964. The Ministers concluded that the fishery resource in Canada's inland waters and coastal seas can support a long-term expansion of the fishing industry. The future for Canadian fishermen is bright if a progressive program of education, modernization, and economic encouragement is adopted. The representatives of the Canadian Federal Government and the 10 Provinces agreed to cooperate in working out a national fisheries development program patterned after that in effect for Canadian agriculture.

Such a fishery program would include measures to: (1) expand the available resource, (2) improve catching and processing methods, (3) diversify products and improve quality, and (4) expand markets and reduce price uncertainty. The program would be designed to bring about greater productivity and efficiency in all phases of the fishing industry. It would also have to consider the increasingly important sport fishery.

Many aspects of the fisheries were considered at the Conference. Some of the conclusions reached follow:

The Conference clarified the responsibilities of Federal and Provincial governments in various phases of administration and development. Although the Federal Government has sole responsibility for the enactment of fishery regulations in coastal and inland waters, enforcement in many instances has, by agreement, been undertaken by Provincial authorities. The Federal Minister agreed to facilitate administration of regulations as much as possible through appropriate delegation of authority, and to discuss those problems with interested Provinces.

The Provincial representatives unanimously supported the plan of the Government of Canada to establish a 12-mile exclusive fishing zone measured with straight baselines from headland to headland. The new fishing limits would include such waters as the Bay of Fundy, the Gulf of St. Lawrence, Dixon Entrance, Queen Charlotte Sound, and Hecate Strait as Canadian waters.

The Conference stressed the importance of expanded efforts to discover unexploited stocks in ocean and inland waters. Increased explorations are to be undertaken by the Federal Government.

The need for continuing strict control to prevent poaching in the lobster fishery was emphasized.

Considerable interest was shown by several Provinces in the development of commercial fish farming.

The problem of pollution was recognized as being one of the most serious facing the fisheries today. The need was emphasized for corrective measures. The importance of fisheries representation on pollution boards was generally agreed upon.

The meeting recognized the tremendous and increasing importance of sport fishing. Although promotion of sport fishing is generally a Provincial matter, the Federal Department of Fisheries has responsibility for managing anadromous species (such as salmon) and, in some Provinces, other species as well.

The Conference stressed the importance of basic research to guide conservation and expansion of fishery resources as well as to improve processing techniques. Also emphasized was the need for more applied research and for more effective communication of the results to fishermen and the industry. It was agreed that the Federal Government, through the Fisheries Research Board, has responsibility for research wherever it may be required, especially in its more fundamental aspects. The Federal Minister agreed that the research effort would be increased insofar as funds and qualified personnel permit.

It was recognized that Canada is in a good competitive position through her proximity to very productive fishing grounds. This opportunity could be used to better advantage by adopting the most modern techniques whether developed in Canada or elsewhere. Assurances were given to the Provinces that the Federal Government intends to expand its technical development services, adapting, testing, and demonstrating new techniques in cooperation with the Provinces.

Attention was drawn to the excellent coordination of effort brought about through the Federal-Provincial Atlantic Fisheries Committee on which five East Coast Provinces and the Federal Department of Fisheries are represented. The Provinces in Canada's central area asked that a similar committee be set up for the Prairie Provinces.

The Conference paid particular attention to the need for better education of fishermen as well as others associated with the industry. It noted the steps being taken by several Provinces to meet this need and the very useful contribution of the Federal Department of Labor through its vocational training assistance program. Much, however, remains to be done and the Conference unanimously recommended greatly increased efforts by all concerned. It was hoped that a greater share of the expanding program of the Federal Department of Labor might be devoted to fisheries. The Federal Department of Fisheries also announced its intention to increase its efforts to give specialized advice and assistance.

The Conference stressed the importance of effective long-term planning to provide adequate harbors, marine works, and navigational aids to meet the changing needs of the inshore and offshore fisheries. It recommended the establishment in each Province of a continuing committee representing the appropriate Federal and Provincial agencies to carry out the engineering and economic studies needed for guidance.

The important question of market development was thoroughly discussed by the Conference. On the problem of export market expansion, the Federal Minister of Trade and Commerce outlined the activities of his department and offered its full cooperation in expanding old and opening up new markets for fishery products. The Conference discussed in detail the possible usefulness of marketing board techniques (similar to those of the Canadian Wheat Board) for the handling of the salted cod production of the Atlantic Provinces and the fresh-water products of the inland lakes. It was agreed that the subject required further specialized study. Arrangements were made for an early meeting between representatives of the Provinces of Ontario, Manitoba, Saskatchewan, Alberta, and the Federal Government to consider establishing a fresh-water fish marketing board. Arrangements were also made to hold a meeting of representatives of the Atlantic Provinces to discuss a proposal put forward by Newfoundland for the establishment of a salted cod marketing board.

The Conference considered present arrangements for the provision of financial assistance to fishermen and the fishing industry. The general view appeared to be that present arrange-

Canada (Contd.):

ments suffered from a lack of coordination and in some particular instances failed to meet requirements. The consensus was that the objectives of a fisheries development program called for the investment of public and private funds in a coordinated and comprehensive program, designed to operate on a national scale but adapted to regional needs. Such a program would include improved credit facilities and some adjustment of present vessel construction assistance measures. It was generally felt that Provincial loan agencies could best meet the capital credit requirements of fishermen, but the view was expressed that the Federal Government might assist through making available additional capital for such purposes.

The Federal Minister said that the need for assistance coming under the main headings of credit, subsidies, and grants varied in different Provinces and areas. He suggested that the matter should be further discussed between the Federal and Provincial Governments on a regional basis. (Report by Canadian Minister of Fisheries, Ottawa, January 24, 1964.)

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FISHERIES MINISTER EMPHASIZES NEED FOR SCIENTIFIC RESEARCH:

The need for a scientific basis to maintain and develop Canada's fisheries was emphasized by the Canadian Fisheries Minister in a message on January 4, 1964, to the opening of the annual meeting of the Fisheries Research Board of Canada. The protection of the fisheries resource through domestic or international regulation of fishing depends on research into many important stocks, said the Minister, and the hope for improvement of the resource through cultural methods depends on biological research of a complicated and basic nature. Canada's competitive position, internationally, depends on the quality and volume of her research effort on the high seas. The Minister also mentioned the dependence of industry on research for the technical development of processing techniques.

The Fisheries Research Board of Canada is made up of 18 members who serve without salary and are drawn from the scientific staffs of Canadian universities, the fishing industry, and the Government. The Board directs the scientists, oceanographers, and technologists working from seven research stations throughout Canada. (Canadian Department of Fisheries, Ottawa, January 6, 1964.)

The following reports and subjects on research conducted by Canadian fishery laboratories and stations were discussed at the annual meeting of the Fisheries Research Board of Canada, held in Ottawa in early January 1964:

COD POPULATION IN NORTHWEST ATLANTIC STUDIED:

Cod spawn progressively later in the south than in the north in the Newfoundland area, and the largest fish are generally the last to spawn. This was brought out in maturity studies carried out by scientists attached to the St. John's (Nfld.) Biological Station of the Fisheries Research Board of Canada. In their 1963 studies, the scientists found that, in April, spawning was nearly completed in the Labrador and Northeast Newfoundland Shelf area, although it had not yet begun on the northeastern Grand Bank. On the northern Grand Bank, spawning was almost completed by the latter half of May.

For age and growth studies of the cod, the fisheries scientists collected about 20,000 pairs of otoliths (ear bones). The otoliths were taken from fish caught in inshore and offshore waters and will be examined at the St. John's laboratory.

The 1963 cod study also covered routine sampling of the inshore fishery. This will provide biological background information to be used in population studies of cod in the area. The sampling was carried out in the spring, summer, and fall at regular sampling stations in several of the larger fishing ports. Commercial fishermen working the inshore waters reported varying regional success with traps, and generally poor results with other gear throughout the season. The nylon gill net became an important gear in use in many localities.

The studies revealed that, in the inshore fishery, cod are first retained in numbers by cod traps at four years of age. During 1963, the bulk of the trap catches consisted of cod in the 5- and 6-year age group. For the various line gears, cod aged from 6 to 8 predominated. But in the fishery using nylon gill nets, most of the cod caught were of large size, age 8 and older.

NORTH ATLANTIC LOBSTER INDUSTRY:

Studies of the North Atlantic lobster (Homarus americanus) from the larval stage to marketing, and the economic effects of maritime lobster regulations were discussed at the annual meeting of the Fisheries Research Board of Canada, held in Ottawa early in January 1964. Over the years a very large store of knowledge has been built up around that marine crustacean which is the source of millions of dollars in revenue to Canadian and United States fishermen. The catch of about 50 million pounds a year and its generally high price make the lobster the most valuable single species taken by Canadian fishermen.

Canada (Contd.):

At the January meeting, present and future research on marine crustaceans was discussed. Scientists of different disciplines, while stating that much has been learned about the lobster, reported that there are still many unknown factors which must be studied, and they are collaborating in the effort to throw more light on the subject. Biologists and technicians at the St. Andrews, N. B., Biological Station of the Board are concentrating on the biological aspects, and scientists at the Board's Technological Research Laboratory in Halifax, N. S., are centering their attention on the chemistry of the Atlantic lobster. At the same time economists of Canada's Department of Fisheries are examining the structure, organization, and operations of the lobster fishing enterprise in the Atlantic provinces.

Management of the lobster fishery was essential to continued productivity, stated one of the biologists associated with studies conducted at the St. Andrew's station. He described the application of size limits and fishing seasons, which vary in different areas of the Canadian Atlantic coast, on the stocks of lobsters. In the area east of Halifax the fishing season usually lasts two months, generally in the spring; west of Halifax the seasons are longer but extend through the winter and early spring. Peak lobster landings are made in May and June. The biologist said that short fishing seasons did not necessarily reduce the catch, as the fishermen tended to increase their fishing during the shorter open seasons. While the productivity of lobsters is conditioned more by natural factors than by regulations, the latter are necessary not only from a conservation standpoint but for their economic effects.

The meeting was told that interaction of the biological and the economic factors is particularly intense in the lobster fishery. An official of the Economics Service of the Federal Department of Fisheries described the economic effects of regulations as divided into three main categories: (1) administration, such as licensing of fishermen, the establishment of fishing districts and limitation of the number of traps; (2) conservation, including limitation of the type of gear, minimum size limits, length of seasons, and prohibition of the taking of egg-bearing lobsters; and (3) marketing, which was related to the allocation of fishing seasons by districts and minimum size limits.

The physiological aspects of lobster research, both in relation to the shipment of live lobsters and the lobster in its natural environment were reported on by two scientists of the Board's St. Andrews station. Scientists who are also SCUBA divers have begun an underwater study in certain sections of Northumberland Strait to determine where lobster larvae settle after they leave the free-swimming stage which they enter when the eggs are released from the female, and sink to the bottom of the ocean. These larval studies were begun 20 years ago, and one of the aims is to find out if future stocks can be predicted on the basis of larval abundance. The underwater work is tied in directly with laboratory observations on the commercial possibilities of lobster stocks, made with a view to aiding the lobster industry.

Fisheries technologists engaged in studies at the Halifax laboratory are directing their attention to the chemistry of the lobster. With the rapidly increasing demand for live lobsters, scientists are seeking more information on the effects of live-holding on the physiological condition of the lobsters and their ability to withstand infection and the stresses of live-holding and shipment of the lobsters themselves. Reporting on this aspect, it was stated that many factors are involved, and if not properly controlled can lead to the death of lobsters with ensuing financial losses to the industry. Biochemists have proved that the constituents of the lobster's blood, particularly the blood cell counts, are altered during live-holding and can serve as indexes of the general health of lobsters. Experiments have shown that weakened lobsters can be strengthened and their resistance to infection increased by proper feeding in fresh sea water.

Research by biologists has proved that lobsters generally remain in a local area and that they move about very little. A member of the Board pointed out that lobsters are internationally known when it comes to marketing. The Board member, who operates one of the biggest if not the biggest lobster holding pound in the world, said that within hours after the lobsters are caught on the Atlantic coast, they are ready to be eaten in such widely separated cities as Ottawa and Paris, and in countries including Holland, Belgium, and throughout the United States. He added that there were probably more lobsters flying the Atlantic Ocean today than people.

While acknowledging the enormous amount of research already done on lobsters, it was pointed out at the Board meeting that further studies were required in catching, handling, processing, and shipping. There was great concern over the loss of lobsters through natural mortality after they are caught and it was felt that more knowledge of the species, which would indicate improved handling and holding conditions, might counteract this loss. In such research, it was felt that the Fisheries Research Board, the Federal Department of Fisheries, and the fishing industry each had a part to play.

Research being conducted by the Board's Biological Station at Nanaimo in British Columbia on crab and shrimp on Canada's Pacific coast was related by another biologist. One of the problems facing the crab fishery is "ghost fishing" . . .the continued kill by traps which are lost but, because of their sturdy construction, continue in fishing order, thus killing many crabs which cannot be recovered. The Canadian scientists were working on a variety of corrodible metal wires which would deteriorate and cause lost traps to collapse. Investigations on shrimp are designed to provide further information on stocks in the major shrimp trawling areas as well as to delineate the extent of shrimp fishing grounds.

Studies relating to lobsters and shrimp in Newfoundland waters was another subject discussed by a scientist from the Board's Biological Station in St. John's, Newfoundland. Stocks of shrimp had in the past been found as the result of exploratory fishing but a commercial fishery had yet to be developed. A practically interesting line of research on lobsters concerned the social behavior of the creatures. There were indications that lobsters establish personal territories and resist the efforts of other lobsters to reside within their sphere of habitation. This would take the form of cannibalism by older lobsters on the young, and fighting off intruders. Studies on growth rates, the scientist said, had shown that lobsters increase in weight by almost 50 percent after their first molt and by about 40 percent after the second molt. This indicated strong support for the returning of small, undersize lobsters to the water in order to let them grow to larger and more profitable market sizes. (Canadian Department of Fisheries, Ottawa, January 7, 1964.)

PACIFIC SALMON TRANSPLANTED TO ATLANTIC COAST:

The experimental transplanting of British Columbia pink salmon eggs to a stream 5,000 miles distant in Newfoundland may enrich

Canada (Contd.):

East Coast salmon resources. The project is being carefully watched by the St. John's Biological Station of the Fisheries Research Board of Canada.

In the fall of 1962, 2.5 million eggs flown in from Briish Columbia were planted in a channel of the North Harbor River on the Avalon Peninsula of Newfoundland. Survival was excellent. The fry run amounted to 84 percent of the transplant as a result of favorable weather during the planting, scarcity of silt in the river, and moderate winter conditions.

Hatching began around February 15 and was completed by March 22, 1963. The fry run extended from May 7 to June 16, reaching a peak on May 24. In two days (May 23 and 24), over a million fry, or half the total run, passed through the counting fence. In their seaward migration, it was noted that the fry remained near the surface and close to shore. In two months, they had moved 22 miles from the mouth of the river.

Predation did not appear to be a serious problem. Sampling of trout moving downstream in the river indicated 12 percent had been feeding on the salmon fry. Further investigation disclosed no predation from herring. Sampling of commercial catches of cod in St. Mary's Bay revealed no fry in the stomachs of nearly 4,000 fish examined.

The exceptionally good survival and the comparatively minor loss through predation are promising signs in the attempt to introduce a new species of salmon to Newfoundland.

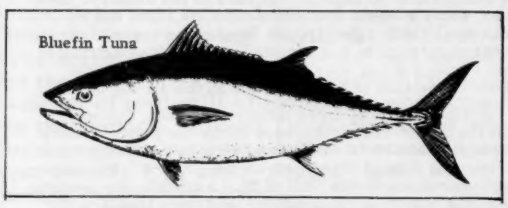
SALMON ESCAPEMENT ON EAST COAST IMPROVED IN 1963:

The escapement of Atlantic salmon to spawning grounds in Newfoundland rivers in 1963 was encouraging, according to the St. John's (Nfld.) Biological Station of the Fisheries Research Board of Canada. The Little Codroy River had its largest run since 1957. The increase, due mainly to a large number of grilse, was about twice the escapement recorded during the years 1960-1961. Throughout the migration period, water levels in the rivers were generally favorable, and the spawn-bearing fish had little difficulty getting upstream.

On the other hand, the run of smolts (young salmon on their first seaward migration) was the smallest on record for the Little Codroy River. This was probably due to the small numbers of adults that entered the river in 1959 and 1960.

TUNA MIGRATIONS OFF ATLANTIC COAST STUDIED:

The tagging of 18 bluefin tuna off St. Margaret's Bay, Nova Scotia, in the summer of 1963, initiated a Canadian study of Atlantic tuna migrations. The work is being done by scientists of the St. Andrews (N. B.) Biological Station of the Fisheries Research Board of Canada. The marking experiment involved large bluefin weighing between 400 and 600 pounds. After capture in a trap net, the giant fish were tagged with dart-type tags and released. None of the tags had been recovered by early January 1964.



That bluefin tuna cross the Atlantic Ocean has been proved by United States tagging studies. But much more information about tuna movements is needed. For example, a few years ago, tuna suddenly disappeared from the waters off Wedgeport, N. S., which had been a famous hunting ground for sport fishermen. Now, with increasing attention being given to the newly developed purse-seine fishery for tuna in the Atlantic, St. Andrews scientists hope to gain new knowledge about this elusive fish.

Late in the summer and early fall of 1963, two fishing craft out of Campobello initiated the first tuna-seining project by Canadian fishermen on the Atlantic. The fishing was carried on along the American seaboard as far south as Block Island. One of the boats enjoyed a fair degree of success considering the lateness of the season and newness of the operation.

HARP SEAL STOCKS DECLINE:

To learn more about the declining stocks of harp seals in the Gulf of St. Lawrence, extensive tagging of "whitecoats" (young harp seals) has been undertaken by the Canadian Fisheries Research Board's Arctic Unit.

Canada (Contd.):

The Board is offering a nominal reward for recaptured harp seal tags which are returned to the Arctic Unit in Montreal. Scientists expect the tags to provide additional clues concerning the population of the seal herd in the Gulf of St. Lawrence, the animals' migration patterns, and the proportion of the whitecoats caught by sealing activities each spring.

Extensive data already collected by the Arctic Unit reveal that the stocks of harp seals in the Gulf of St. Lawrence as well as on the "Northern Front" (off the east coast of Newfoundland and Labrador) have been going down in recent years, the indications being that the catch has been too high. The increase in the value of seal pelts has heightened the pressure of seal hunters.

As the result of aerial surveys and other studies, scientists have estimated the combined population of seals on both the "Front" and in the Gulf to be somewhat less than 1.5 million seals. It is thought that about one-third of the pups whelped each year can be safely harvested. But the annual catch is believed to be considerably in excess of that proportion.

Because of the low level of sealing activities during World War II, the seal herds showed a considerable buildup. Since that time, sealing operations have been intensified to the point where they are now thought to be comparable to those at the turn of the century. However, today's fleets are more efficient. The use of helicopters and light aircraft have given the sealers greater versatility and striking power. It is estimated that aerial sealing accounted for one-half the seals taken in the Gulf of St. Lawrence in the spring of 1963.

In 1963, ships of three nations--Canada, Norway, and the Soviet Union--engaged in the harp seal fishery in the Northwest Atlantic, observing by mutual consent an opening date of March 10 on the "Front." For Canadian operations in the Gulf of St. Lawrence, the opening date was March 5. In addition, landsmen (sealers operating from the shore) took seals when favorable winds brought the icefloes within walking distance. They also took seals in nets during migrations in other seasons.

The recognition last spring of an earlier closing date (April 30) for killing seals is believed to have helped reduce the catch of the older, breeding seals. In order to pursue additional seal conservation measures, the problem has been brought before the International Northwest Atlantic Fisheries Commission, which is concerned with the investigation and conservation of the major fisheries in the Northwest Atlantic. It is hoped that harp and hood seals can be brought within the responsibility of the Commission by a protocol amendment to the Convention under which this Commission operates. Ratification of such an amendment by member countries is expected. (Canadian Department of Fisheries, Ottawa, January 8, 1964.)

NORTH PACIFIC GROUNDFISH RESOURCES STUDIED BY SCIENTISTS:

The groundfish resources of the North Pacific Ocean are being studied by fishery scientists of the Nanaimo (B.C.) Biological Station of the Fisheries Research Board of Canada. The Pacific ocean perch is a species of considerable economic value off British Columbia. Farther to the north, it is sought mainly by foreign fleets. But changing market conditions or other situations may eventually influence the devlopment of a Canadian offshore ocean perch fishery and, if this happens, the Research Board will have the answers to the questions which industry may raise.

Using the new research vessel G. B. Reed, scientists of the Nanaimo Biological Station carried out two major North Pacific investigations in 1963. On the initial cruise, extensive explorations for ocean perch were conducted in the eastern Gulf of Alaska in the area off Cape Spencer. The second cruise extended farther west covering grounds in the vicinity of Kodiak Island. The second cruise had a double purpose. Studies were made on the local shrimp populations as well as on the distribution of ocean perch.

The first cruise covered waters where no fishery existed. Large catches of ocean perch were common--as much as 16,000 pounds were taken per 30-minute drag.

The Nanaimo Biological Station plans to expand its program in order to obtain additional information on the biology of the ocean perch.

SALMON STUDIES IN GULF OF ALASKA:

Significant numbers of pink salmon of Asian origin travel as far eastward as the mid-Gulf of Alaska. This was learned during tagging studies by Canadian fisheries scientists. Personnel of the Nanaimo (B.C.) Biological Station of the Fisheries Research Board of Canada have also found that some of the chum salmon tagged in the Gulf of Alaska are of Asian stocks. Tagging programs have been the key to a major break-through in obtaining knowledge of salmon during their ocean existence.

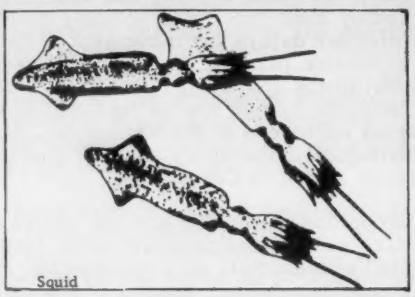
Early in 1964, Canada's new research vessel G. B. Reed and a United States research vessel will begin cooperative North Pacific investigations in an effort to find where salmon spend the winter months.

The two vessels will range over an area extending from the Oregon coast to the Aleutian Islands.

Canada (Contd.):

FISHERY RESOURCES OF FAR NORTH SURVEYED:

A wide assortment of unusual species is found in the water wastes of Canada's far north. There are octopus, squid, crab, long-toothed narwhal (whales), and curvetoothed walrus. Also found, are tiny fossil skeletons of organisms normally found at great depths under tropical Atlantic waters, according to a report at the annual meeting of the Fisheries Research Board of Canada.



Squid

Both the octopus and squid are normally warm water species, but some crab and a relatively small species of squid have previously been found in the colder northern areas. But octopus had not previously been found in the North American Arctic region until dredged up from the bottom of Darnley and Franklin Bays by scientists of the Board's Arctic Unit in 1963. Scientists were also surprised to find tiny calcareous fossil skeletons called "discoasters," which micropaleontologists had considered to be extinct products of unknown organisms. The fossils were found in primitive, tiny, whiplike creatures called dinoflagellates whose discoasters are identical to those forming deep sediments found in a core drilled to a depth of 12,450 feet below tropical Atlantic waters.

The narwhal is a whalelike species with a corkscrew tusk sometimes reaching nine feet in length. The narwhal's blubber and edible meat are good sources of oil and food, while the tough carcass provides large strips of valuable sinew used in sewing boots and clothing. The long ivory tusk is of some practical value to the natives who sell it intact for C$1 a pound. A large tusk will weigh as much as 40 pounds.

The Canadian scientists investigated the range of virtually untapped populations of Greenland cod which inhabit Dolphin and Union Straits and Coronation Gulf, between the District of MacKenzie and Victoria Island. Such a resource has prime importance as a domestic food supply which would also help relieve the pressure on other species, such as char and lake trout, and on the limited mammal stocks.

The project of depth-probing and surveying fish populations in Canada's Great Bear Lake also was discussed by scientists of the Board's Arctic Unit at the annual meeting of the Fisheries Board of Canada.

Great Bear Lake is located within the Arctic Circle in Canada's Northwest Territories and has an area of 11,800 square miles making it the fourth largest lake on the North American continent. Only Great Slave Lake, also in the Northwest Territories, is as deep as Great Bear. During the summer of 1963, a 5-pound lake trout was caught in a fishery scientist's test net and hauled straight up from a "float-popping" depth of 1,350 feet. The scientists were sure the net had fished at the bottom of the lake because of the large amount of mud still clinging to it when brought to the surface. Plastic floats on the net were broken by the pressure and it seemed apparent that the type used "popped" apart at around the 600-foot depth.

The abundance and even the condition of the fish stocks in Great Bear Lake vary widely in different parts of the lake. But whether caught below or above "float-popping" levels, the lake trout there run to unusually large sizes. One angler, using light spinning tackle, caught four lake trout in one afternoon with the largest weighing in at 30 pounds. The largest lake trout netted by the scientists scaled 40 pounds and there are reports of 60-pounders having been taken. The prospects for a commercial fishery on Great Bear Lake are not very promising at this time mainly because of its remoteness, but the native population depends on that large body of water for a major part of its food supply. The lake also provides an excellent sport fishery and there are several sportsmen's lodges in the vicinity.

Another northern species within the Arctic Circle, on which intensive studies continued during the past year, is the Arctic char. This species has been sold commercially and has met with some success in a number of large cities in Canada and the United States. Com-

Canada (Contd.):

mercial fisheries for char have been established at Wellington Bay on the south coast of Victoria Island, Frobisher Bay on Baffin Island, Payne Bay on the west side of Ungava Bay, and Port Burwell on the east side of Ungava.

The Arctic char is a slow-growing fish and in some of the more northern areas the fish are as much as 28 years old when they reach an average maximum size of seven pounds. The size of the fish varies and specimens up to 23 pounds have been caught.

Commercial fishing operations for Arctic char were initiated after scientific studies were made to determine the quantity that may safely be harvested each year. Subsequent studies have shown the presence of Arctic char in many other areas but the most promising new find up to now is the Nettiling Lake system on Baffin Island. On the basis of a yield of one pound of fish per acre, it is estimated that this lake (which is the sixth largest in Canada) could produce a yearly quota of 500,000 pounds of char without fear of depleting the resource. But considerable additional studies will be required to substantiate that theory, and before any commercial operations could be started, facilities for handling the catch as well as for shipping to southern markets would be necessary.

Note: See Commercial Fisheries Review, March 1963 p. 51.

DEVELOPMENTS IN REFRIGERATION ABOARD VESSELS:

There is a growing use in Canada of shipboard refrigeration systems developed by the Vancouver (B.C.) Technological Laboratory of the Fisheries Research Board of Canada. The total single-trip holding capacity of the refrigerated sea water systems on Canadian vessels amounted to nearly four million pounds at the end of 1963. That type of refrigeration is widely used on British Columbia salmon transport vessels.

Two large tuna purse-seine vessels being built in eastern Canada will have brine-spray freezing systems which were also developed by the Vancouver Technological Laboratory in collaboration with the Industrial Development Service of the Canadian Department of Fisheries.

The largest fishing vessel built in British Columbia in recent years, the Royal Pacific, was equipped with a brine-spray freezing system as well as a dry cold-storage. A sistership under construction will have similar refrigeration equipment. Those vessels will probably employ the equipment to freeze halibut at sea.

"AIRLIFT" PUMP TO UNLOAD FISHING VESSELS BEING DEVELOPED:

Fish larger than herring are usually discharged by hand-forking to hoisting devices. This process delays the movement of fish to the production line and, in itself, can be detrimental to the quality of fish. To overcome this problem, pumps are being developed by fisheries engineers of the Vancouver, (B.C.) Technological Laboratory of the Fisheries Research Board of Canada.

Two pumps employing similar cycles of alternate suction and pressure were built and operated successfully on a commercial scale. The pumps can deliver about 1,000 pounds of salmon per minute.

The third and latest pump employs the "airlift" principle. The "airlift" pump, which is now being tested commercially, has no moving parts and requires only a supply of low-pressure compressed air for its operation. It is a simple system which can be installed on vessels or at dockside at comparatively low cost.

IMPROVEMENT IN TEXTURE OF FISH FILLETS STUDIED:

The texture of cod fillets can be improved, according to scientists of Canada's Fisheries Research Board who have been investigating the texture of fillets cut from that species. They have found that, depending on the condition of the fish at the time it is caught, holding the fish alive for limited periods in 40° F. sea water before slaughtering can result in better textured fish fillets for freezing.

The cod studied were small and medium fish which spend part of their lives each spring and summer feeding in the relatively warm waters (45° to 55° F.) along the Northeast Atlantic Coast. Sea water at a temperature of 50° F. is relatively warm for cod as

Canada (Contd.):

compared with bottom waters on the fishing banks having a temperature as low as 33° to 35° F. Shore catches must often be held alive in sea water almost that cold before the meat undergoes changes sufficiently great to be noted by those tasting the cooked sample.

The texture studies are being conducted by the Board's St. John's Unit which reported at the annual meeting in Ottawa on January 7 on the apparent high quality of some of the cod landings. Those fish do not need to be held alive. Other lots of fish caught live and subsequently held in 40° F. sea water have been slaughtered, processed and frozen, and found by taste panelists to be much superior in texture to fish processed within a few hours after being taken from the sea. In some instances holding times as short as ten days have been beneficial.

More work is being done to establish the full range of benefits from a period of live storage in relatively cold sea water. Scientists are also tackling the problem from still another angle--changing the methods of handling and chilling fish killed at cod traps. If those fish could be treated so that they would keep well in frozen storage it would not be necessary to hold them live for a period of time. But so far, best results have been obtained by dealing with the live fish.

NEW METHOD TO SPEED TUNA CANNING DEVISED:

The time consumed in processing tuna from the raw to the canned state has been significantly reduced as a result of a new method devised by scientists of the Fisheries Research Board of Canada. Personnel of Canada's Technological Research Laboratory at Vancouver, B. C., worked closely with a British Columbia fish-processing plant in modifying a retort, the huge "pressure-cooker" used in the canning process. The modifications included reinforcement of the retort to withstand a vacuum, and the installation of special devices for steam condensation and ejection of condensing water.

Tuna, unlike salmon and most other fish, must be precooked prior to the actual canning. Whole tuna are placed in the retort and cooked for a predetermined period of time. Until this new method was introduced, the precooking was followed by a cooling period of several hours in which no further processing could take place. As a result of the modifications by Canadian scientists, this delay no longer is necessary as very rapid cooling is accomplished under vacuum and the tuna can be processed immediately.

SCIENTISTS DEVELOP NEW PROCESS FOR SMOKING SMALL FISH:

In order to reduce handling costs when smoking small fish such as smelt and alewives and to improve product appearance, Canadian scientists have incorporated new features into a vertical-type smoke tunnel. Fish are fed into the smokehouse at one end and they emerge automatically at the other end, fully smoked. The speed of the conveyor system inside the smokehouse can be regulated to insure sufficient smoke pickup.

Ordinarily, small fish shrivel during smoking and they also show screen marks on their sides. But specially-built holders in the improved smokehouse tumble the fish gently so that they assume a firm, roundish shape, free of wrinkles and of screen marks.

Additional work to further improve the new smokehouse is being done by the Fishery Research Board of Canada at its Technological Station in London, Ontario.

NEW ELECTRONIC FISHERY RESEARCH AIDS DEVELOPED:

New electronic devices to improve fisheries research techniques are being introduced at the Nanaimo (B.C.) Biological Station of the Fisheries Research Board of Canada. A photo-electric apparatus designed to count migrating sockeye salmon shows promise of doing the job more accurately, much faster, and with less effort than methods currently in use. The photo-electric fish counter underwent large-scale tests in 1963 at Babine Lake in northern British Columbia.

A new instrument which makes it possible to observe young salmon while they are still submerged in gravel beds is also in development. The "snooperscope" uses infrared light to illuminate the young salmon and make them visible to the eye. The use of infrared light protects the salmon from the effects of ordinary light at this sensitive stage.

Canada (Contd.):

A third instrument already being used successfully is an electronic baleen plate reader. This device accurately sketches a diagram of the tiny ridges on sections of baleen taken from whales. The number of ridges is a fairly accurate indication of the age of a whale. Earlier, the ridges were read by touch, a difficult task even for experienced personnel.

WAYS OF PRODUCING FISH PROTEIN CONCENTRATE STUDIED:

The production of fish protein concentrate (FPC) from noncommercial species (dogfish, skate, sculpin, etc.) is being studied by scientists at the Halifax Technological Station of the Fisheries Research Board of Canada. After producing FPC (also known as fish flour) from haddock and cod fillets, the Halifax investigators began experiments with whole fish (including herring), fish offal, and semiprocessed fish meal known as "press cake." The FPC produced from fillets received the highest protein rating, its flour being whiter than that produced from other raw materials. However, in all cases the protein rating was excellent.

The development of FPC is a project sponsored by the Food and Agriculture Organization of the United Nations. It has been undertaken by many of the world's leading fishery research laboratories, including the station at Halifax. The program is prompted by a desire to supply underdeveloped nations with a cheap supply of animal protein. Also, dietetic studies showed that in Canada and the United States there is need for additional proteins in some diet formulations, especially for people engaged in heavy manual work, postoperative patients, and elderly people. One of the simplest uses of the product has been as an additive to bread and cereals.

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FISH MEAL EXPERIMENTALLY STORED IN 2,000-POUND CONTAINERS:

A new method of storing herring meal in one-ton packages is being investigated by the Vancouver (B.C.) Technological Laboratory of the Fisheries Research Board of Canada. The 2,000-pound containers are made of laminated paper. At present, herring meal is usually stored in 100-pound bags, which reduces the amount of herring meal that may be stored in a given area. One of the major problems in storing herring meal in bulk is the self-heating tendency of the meal. To suppress this tendency, antioxidants have been added to the meal in the large containers. The preliminary results of the project are encouraging. (Canadian Department of Fisheries, Ottawa, January 6, 7, and 8, 1964.)

Denmark

LANDINGS AND FISHING INDUSTRY TRENDS, 1962-1963:

Preliminary data on Denmark's 1963 total fishery landings show they were up 3.3 percent in quantity and increased 1.0 percent in value from the previous year. The 1963 landings were greater for cod (up 9.6 percent) and plaice (up 4.5 percent), but herring and sprat were down slightly from 1962.

Table 1 - Danish Fishery Landings by Principal Species, 1961-1963

Product	1/ 1963			1962			1961		
	Quantity	Value		Quantity	Value		Quantity	Value	
	Metric Tons	1,000 Kr.	US$1,000	Metric Tons	1,000 Kr.	US$1,000	Metric Tons	1,000 Kr.	US$1,000
Plaice	60,000	98,000	14,210	57,379	91,480	13,265	53,176	87,094	12,629
Cod	69,000	59,000	8,555	62,904	51,443	7,459	65,539	54,268	7,869
Herring and sprat	267,000	75,000	10,875	272,900	80,607	11,688	267,416	79,301	11,499
Pond trout	8,000	61,000	8,845	7,838	56,790	8,235	7,662	53,037	7,690
Other	401,000	175,000	25,375	378,334	182,981	26,532	237,108	141,431	20,507
Total landings	805,000	468,000	67,860	779,355	463,301	67,179	630,901	415,131	60,194

1/Preliminary.
Note: One Danish krone equals about US$0.145.

A greater proportion of the 1963 landings than in 1962 was utilized by processors for fillets of flatfish and cod, and there were some increases from the previous year in the quantity of fish used for smoked and canned fish.

There also were some gains in the 1963 production of fish meal and oil as compared with the year earlier.

Denmark's exports of fish and shellfish during the year were up 10.2 percent from

Denmark (Contd.):

Table 2 - Fish Used to Produce Edible Processed Products in Denmark, 1961-1963

Product	1963	1962	1961
	(Metric Tons)		
Used by processors:	1/180,000	1/135,918	1/120,058
For fillets of flatfish and cod	93,000	79,000	-
For smoking	6,500	6,200	-
For canning	17,000	15,000	-

1/Does not include fish meal and fish oil production.

Table 3 - Danish Fish Meal and Oil Production, 1961-1963

Byproduct	1963	1962	1961
		(Metric Tons)	
Fish meal	90,000	88,200	57,900
Fish oil	25,000	24,500	17,300

1962 and the value increased 3.7 percent as compared with the previous year.

In 1963, there was a slight decline in the number of fishermen permanently engaged in Denmark's commercial fishery. There were also fewer fishermen in 1962 than in 1961. But the average annual gross income for 1962 increased 14.6 percent from 1961.

The value of Denmark's commercial fishing fleet and fishing gear and nets was higher in 1963 than in the previous year.

Denmark's per capita consumption of edible fishery products in 1963 rose to 16.0 kilograms (35.3 pounds) from 14.3 kilograms (31.5 pounds) in 1962. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, January 15, 1964.)

Note: See Commercial Fisheries Review, October 1963 p. 46; September 1963 p. 62.

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INDUSTRY VIEWS PRESENTED AT ANNUAL MEETING OF DANISH FISHERIES COUNCIL:

The annual meeting of the Danish Fisheries Council opened January 11, 1964, at Aarhus, Denmark. The Council was established in April 1954 by the leading Danish fishery organizations to present a single, united front in promoting and protecting the interests of the entire industry.

In opening the 1964 annual meeting, the Chairman recommended some consolidation

Table 4 - Danish Fishery Products, Exports, and Imports, 1961-1963

Classification	1963			1962			1961		
	Quantity	Value		Quantity	Value		Quantity	Value	
	Metric Tons	1,000 Kr.	US$1,000	Metric Tons	1,000 Kr.	US$1,000	Metric Tons	1,000 Kr.	US$1,000
Exports of fish and shellfish	351,000	615,000	89,175	318,514	593,080	85,997	270,728	482,280	69,931
Imports of fish and shellfish	1/	-	-	163,544	166,811	24,188	126,343	123,919	17,968

1/Data not available.

Table 5 - Number of Danish Commercial Fishermen Employed and Average Annual Gross Income, 1961-1963

Type	1/1963	1962			1961		
			Average Annual Gross Income			Average Annual Gross Income	
	Number	Number	Kroner	US$	Number	Kroner	US$
Fishermen:							
Permanently employed	13,280	13,416	26,080	3,782	13,675	22,755	3,299
Occasionally "	4,370	4,343	1/	-	1/	-	-
Total	17,650	17,759	-	-	13,675	-	-

1/Data on income not available.

Table 6 - Value of Danish Commercial Fishing Vessels and Equipment, 1961-1963

Units	1963		1962		1961	
	Value					
	1,000 Kr.	US$1,000	1,000 Kr.	US$1,000	1,000 Kr.	US$1,000
Fishing vessels	454,000	65,830	437,877	63,492	416,890	60,449
Fishing gear and nets	117,000	16,965	108,816	15,778	102,798	14,906
			(Number)			
Type of vessel:						
With motors		1/	8,350		8,347	
Without motors		1/	5,526		5,692	
Transporters		1/	22		24	
Total		-	13,898		14,063	

1/Not available.

Denmark (Contd.):

of fisheries organizations, reaffirmed the need for an independent secretariat to work on market promotion, and suggested increased foreign contacts by industry and Government representatives. Discussing ex-vessel prices, the Chairman said that minimum prices for plaice, or any other species, should be worked out by fishermen with processors and exporters on a countrywide basis. He pointed out that the Council could serve as a link between the various groups.

Fishermen: The fishermen's representative stated that the 1963 catch was large but economic progress for fishermen was unsatisfactory. He declared that the considerable increase in the price of new and used fishing vessels made it difficult for young fishermen to acquire the capital needed to buy their own vessels.

Pointing out that fishermen own, alone or jointly, the greater part of the production capacity in Denmark, he called for more influence by fishermen on the processing and marketing of food fish. Bornholm fishermen have engaged in processing for years, and Esbjerg fishermen now are establishing two fillet plants. If the undertaking meets expectations--more stable ex-vessel prices--similar efforts will probably be made in other ports.

Exporters: The exporters' representative pressed for the fishing industry to take a joint position on market promotion, stating that with a joint effort new markets could be won and old ones maintained. He also said there should be a minimum size of 270 millimeters (10.63 inches) for plaice landed by fishermen. In Denmark, exporters normally combine processing and exporting.

Food-Fish Processing: The represntative of this segment said that markets for fish fillets should be good in the coming year. He said that fishermen and processors, under the auspices of the Council, should establish a minimum price level for small plaice which would be fair to all concerned. This could lead to the solution of many other problems, including a minimum size limit for plaice. He said that the future will require close cooperation between fishermen and processors.

Retail Markets: The retailer's representative said there is a need for date marking of all frozen fish and fish products if customers are to be given the best possible service. Canned fish should indicate on the label the number of fish or pieces. An indication of the keeping quality--length of storage--should also be included. He also called for other changes in labeling practices.

Fish consumption was 35.2 pounds (round weight) per capita in Denmark in 1962. Despite ready access to superb fresh fish, including live plaice and eels, increasing quantities of frozen packaged fish are being marketed in Danish supermarkets and smaller stores with freezer cabinets.

Industrial Fish: A representative of the fish-meal factories said that fish meal and oil prices should be stable during the coming year. Many of the Danish factories have arranged forward sales of part of their production at good prices. Herring prices may reach 0.25-0.27 kroner a kilo (US$32.95-$35.59 a short ton) during the summer. And prices for sand eels may be about 0.20 kroner a kilo ($26.36 a short ton). The Danish fish-meal industry should consider production of fat-free meal for feeding Danish swine; this offers a very large market. The need for buffer stock warehouses to handle possible overproduction was stressed.

About 45 percent of the Danish fisheries catch is used for producing fish meal and oil. This involves about 75 percent of the herring catch, much of the whiting and brisling landings, and all of the sand eel and Norway pout landings not consumed by other industrial uses such as feed for animals.

Fisheries Ministry: Representatives of the Danish Fisheries Ministry suggested that the small independent exporters consider some form of cooperation among themselves in order to meet the increasing competition of larger organizations. Although exports are at record levels, Ministry officials restated their concern over the difficulties small Danish exporters face in competing with large or integrated foreign fishery companies which can assist their outlets with financial and other merchandising assistance.

The Danish Fisheries Minister said he believed that all concerned had benefitted from the joint meeting. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, January 29, 1964.)

Dominican Republic

PRICES ON CANNED MACKEREL, CANNED TUNA, CANNED SARDINES, AND DRIED COD REDUCED:

An expanded market for canned mackerel (salmon style), canned tuna, canned sardines, and dried cod in the Dominican Republic should result from the reduced prices made possible by Dominican Law No. 34 of October 28, 1963, which freed those fishery products from import duties. The Dominican Bureau of Price Control then established new maximum prices as follows:

Item	Unit	Maximum Selling Price Per Case by		
		Importer	Wholesaler	Retailer
		(US$)		
Canned Fish:				
Mackerel (salmon style)	48 8-oz. cans	6.29	6.73	8.41
Sardines:				
in tomato sauce	100 5½-oz. cns.	8.02	8.58	10.73
in olive oil	100 4⅜-oz. cns.	11.50	12.31	15.39
Tuna in oil	48 7-oz. cans	8.10	8.67	10.84
Dried Fish:				
Cod ("pollock")	100 pounds	24.60	26.32	32.90

The prices listed were contained in Bureau of Price Control Resolution No. 5, which was published in the Listin Diario of December 6, 1963. (United States Embassy, Santo Domingo, December 9, 1963.)

Fiji Islands

STATUS OF TUNA BASE:

Construction of cold-storage facilities at the joint Anglo-Japanese tuna base at Levuka, Fiji Islands, was reported in December 1963 to be 80-percent complete. They include a 60-ton capacity rapid-freezer unit, 2,000-ton capacity cold-storage plant, 30-ton ice-making plant, and a 600-ton capacity ice-storage facility.

The shore facilities are to be operated by the Pacific Fishing Company (PAFCO), which represents three Japanese firms and a local English firm. PAFCO will buy fresh tuna from the South Pacific Fisheries Cooperative Association, then freeze for export to the United States. The export quota for the base is 9,000 short tons of tuna.

The South Pacific Fisheries Cooperative Association is composed of 25 members from the northern prefectures in Japan, 18 from Hokkaido alone. The Association was formerly organized in February 1962, with each member investing five million yen (US$13,900). The Association owns 13 tuna vessels and plans initially to operate out of Levuka a combined total of thirty 99-ton tuna vessels in 1964. (Hokkai Suisan, December 23, 1963.)

German Federal Republic

DEVELOPMENTS ON NEW FISH REDUCTION METHOD:

The new German fish-reduction method, developed by the German inventor Heinz Doevenspeck of Bremen during early 1961, involves the use of electrophoresis and electrostriction to remove the cellular fluids from the tissue of fish and fish offal. The new method obviates the need for external heat, and permits the extraction of oil and raw protein at temperatures of not over 45 degrees centigrade (113° F.).

Knowledge of the new fish reduction method aroused considerable interest both in the United States and abroad, and the inventor has now furnished the following answers to a number of questions asked regarding his invention:

1. The process involves a discharge of condensor fields which produces the following three overlapping effects:

   (a) It increases the electric potential (voltage) of the raw material which has passed through the electric field during the discharge.

   (b) It produces electrostriction of the muscular cells which causes a change in volume and a pulse.

   (c) It produces electroosmosis as well as electrostatic reaction, the latter destroying the so-called NERST electrostatic field between, for instance, the oily and watery phases of the raw material (ref: MILLIKAN tests).

2. (a) The potential gradient used in the electrical discharge is from 6,000 to 12,000 volts.

   (b) It is a static discharge.

   (c) It is not a damped oscillatory discharge.

   (d) It is a pulsed discharge repeated approximately sixteen times per second.

   (e) The energy involved in each discharge is 1,000 Joule (one Joule is the equivalent of one watt per second).

Doevenspeck stated that he has already obtained patents for his invention in Peru, France, and the South Africa Republic. His patent application dated February 1, 1961, filed in the South Africa Republic describes the invention in detail, but the inventor pointed out that it does not reflect the latest stage of development of his reduction method. Certain improvements have been achieved since early 1961, but he did not divulge further particulars because of the involvement of patent rights.

From the beginning of 1962 until about mid-1963, Doevenspeck's method of fish reduction was tested commercially under his management in a pilot plant erected by one of the largest West German trawler companies, which is a

German Federal Republic (Contd.):

leading producer of fish meal and fish oil in West Germany. According to the technical director of the trawling company's pilot plant, the tests were terminated because, in his opinion, the meal and oil yields obtained by the new method compared unfavorably with those obtained by conventional methods.

The inventor of the new fish reduction method later entered into a new contract with a firm in Cuxhaven which manufactured fish meal and an antibiotic poultry feed additive. He started a new pilot plant in the Cuxhaven factory during the summer of 1963 where he is now processing one metric ton of fish per hour with reportedly good results. He claims that his new reduction method was judged favorably by a professor of the Max Planck Institut fuer Ernaehrungs-Physiologie in Dortmund.

With regard to the commercial aspect of his invention, Doevenspeck maintains that the construction costs of his plant are about equal to those of a conventional fish meal plant, while his operating costs are about one-third less. He added that the principle of his invention may be applied to many other fields, e.g. sterilization, decontamination, etc. (United States Consulate, Bremen, December 20, 1963.)

Ghana

FISHERIES AGREEMENT WITH SOVIET UNION SIGNED:

On December 20, 1963, Ghana and the Soviet Union signed an agreement covering cooperation in the field of marine fisheries. The agreement was negotiated during the visit to Ghana of the Soviet Minister of the State Committee for the Fishing Industry. According to newspaper reports, the agreement covers the development of marine fisheries on a commercial scale, the training of Ghanaian fishermen in the Soviet Union, and the establishment of a joint commission to direct technical fishery assistance. The 6-member commission is to be composed of 3 representatives from Ghana and 3 from the Soviet Union.

In September 1963, a total of 92 Ghanaian students went to the Soviet Union for training in fishing techniques. Unconfirmed reports in December 1963 indicated that 88 more students from Ghana would go to the Soviet Union to begin a similar course.

In addition to providing large-scale training programs for Ghanaian fishermen, the Soviet Union has signed contracts to construct a complex of fish-processing factories at Tema and to supply 18 fishing vessels for the State-controlled Ghana Fishing Corporation. According to a statement made in late 1963 in the Ghana National Assembly, 10 of the 17 large fishing trawlers operating off Ghana are of Soviet registry. (United States Embassy, Accra, December 29, 1963.)

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IMPORT DUTY ON FISH AFFECTS JAPANESE AND RUSSIAN TRAWLING IN ATLANTIC OCEAN:

The six-pence (US$0.0696) a pound duty on imports of fresh and frozen fishery products imposed by the Ghanaian Government on October 21, 1963, has greatly affected that part of the Japanese and Russian Atlantic trawl-fishing operations dependent on Ghana as an export market. Moreover, the duty is indirectly working a hardship on Ghanaian consumers since it has already brought about a sharp increase in retail fish prices, by as much as one-third.

Japanese fishing companies in December 1963 were negotiating the reduction of Ghana's high tariff. Also, in mid-December 1963, Soviet Fisheries Minister Ishkov was reported to have arrived in Ghana for the same purpose.

The Japanese fishing company, after the imposition of Ghana's high tariff, has begun to intensify its search for other possible new markets in Africa. Reportedly, that firm, together with a Nigerian and a North European firm, recently established a company in Nigeria called the Nigerian Frozen Foods Development Company. The Development Company has already undertaken the construction of a 1,000-ton capacity cold-storage plant. The plant, which is scheduled for completion in spring 1964, is being constructed so that it can readily be enlarged into a 4,000-ton capacity facility. (Suisancho Nippo, December 19 and 25, 1963.)

Greece

FREEZER-TRAWLER LANDINGS, JANUARY-OCTOBER 1963:

The Greek fleet of refrigerated trawlers and carrier vessels operating in the Atlantic landed 1,318 metric tons of frozen fish in Greek ports in October 1963, down 29 percent from landings of 1,858 tons in the same month of the previous year.

Greek frozen fish landings during January-October 1963 amounted to 15,670 tons, com-

Greece (Contd.):

pared with landings of 13,786 tons in the same period of 1962 and 11,331 tons in the first 10 months of 1961. The increase in landings in 1963 was partly due to an expansion of the Greek fleet of freezer-trawlers. (Alieia, November 1963.)

Note: See Commercial Fisheries Review, February 1964 p. 69.

Guatemala

COMMERCIAL FISHERY LIMITED IN 1963 BECAUSE OF LACK OF VESSELS:

The lack of a fishing port on Guatamala's Pacific Coast as well as an insufficient number of commercial fishing vessels were the major problems facing the development of that country's commercial fishing industry. That observation was made on December 17, 1963, by the Chief of the Department of Hunting and Fishing of Guatemala's Directorate General of Forestry, who felt that the shortage of fishing vessels caused smaller commercial landings of fish and shrimp during 1963. (Several fishing vessels were damaged or destroyed during severe Pacific storms in June 1963.)

The value of Guatemala's fishery products exports in 1962, consisting chiefly of shrimp exports to the United States, was US$942,000.

With regard to vessels from other countries fishing in Guatemala's territorial waters, which extend 12 miles from shore and which are identical with her exclusive fishing zones, the Guatemalan official pointed out that foreign vessels must have licenses to fish within Guatemala's jurisdiction and must process the catch in Guatemalan ports. But he added that no such licenses were held by foreign fishing vessels. He also noted that some foreign fishing vessels were believed to be fishing illegally from time to time in Guatemalan waters but that Guatemala lacked an adequate coastal patrol fleet to police her waters. (United States Embassy, Guatemala, December 20, 1963.)

Ireland

JOINT JAPANESE-IRISH-FRENCH TRAWLING BASE:

A large Japanese fishing company, together with an Irish company and a French organization, are reported to be planning on establishing a joint trawl-fishing base at Galway, Ireland. The joint enterprise is to be established with a capital of 500,000 pounds (US$1.4 million), with each participating firm contributing one-third of the investment. Reportedly, the Irish firm will provide the fishing base and shore-processing facilities, the Japanese firm will invest one 1,500-ton stern trawler, and the French group will undertake the construction of additional similar-type trawlers to be assigned subsequently to the base. Initially, the joint company will employ only one trawler, but plans call for eventual expansion of the trawl fleet to a total of six vessels.

Fishing will be conducted in the North Atlantic Ocean off Iceland principally for cod, and the catch is expected to be ship-frozen for export to Great Britain and other European countries. Ireland is reportedly seeking to have local fishermen conduct the fishing under Japanese guidance. (Minato Shimbun, December 21; Suisan Keizai Shimbun, December 19, 1963.)

Japan

FROZEN TUNA EXPORT PRICE TRENDS, JANUARY 1964:

The Japanese export frozen tuna market was reported to have softened somewhat in January 1964 as compared to December 1963. January 1964 c. & f. prices of frozen tuna exported directly to the United States from Japan proper are quoted as follows: gilled-and-gutted yellowfin US$375 a short ton; round albacore $380-385 a ton. They represent a decline in price of approximately $10 a ton.

The average ex-vessel price of albacore in Japan is said to be 136-137 yen per kilogram ($343-345 a short ton), showing a slight increase. The rise in price is attributed to indications that the Japanese packers will terminate tangerine packing earlier this year and begin packing albacore. They expected to begin tuna packing on a full-time basis by the end of January.

Japan (Contd.):

As of mid-January, Japanese-caught Atlantic Ocean albacore for export to the United States were selling for $325-335 a short ton f.o.b. Las Palmas. (Suisancho Nippo and Suisan Tsushin, January 10, 1964.)

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FROZEN TUNA EXPORT PRICES, DECEMBER 1963:

The Japanese export frozen tuna market was reported to have improved somewhat in December 1963, and the following prices (f.o.b. Japan) were reported for frozen tuna shipped to the United States from Japan proper: round albacore US$340-345 a short ton; gilled-and-gutted yellowfin $335 a ton.

In October 1963, the average f.o.b. export prices of frozen tuna were reported to be $347 a ton for round albacore and $309 a ton for gilled-and-gutted yellowfin. (Suisan Tsushin, December 26 and November 7, 1963.)

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FROZEN TUNA EXPORTS TO THE UNITED STATES, 1962-1963:

Japanese frozen tuna exports (direct shipments and transshipments) to the United States in calendar year 1963 were down about 24 percent from those in the previous year. Direct shipments were down about 33 percent and transshipments were down 10 percent. The decline was due mainly to a drop in exports of frozen yellowfin tuna. (United States Embassy, Tokyo, January 17, 1964.)

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FROZEN TUNA EXPORTS TO YUGOSLAVIA:

Japanese exports of frozen tuna to Yugoslavia for January-December 1963 totaled 12,465 metric tons, an increase of 63 percent

Table 2 - Japanese Exports of Frozen Tuna and Frozen Tuna Products to the United States, 1962

Product	Direct Shipments		Transshipments		Total	
	Qty.	Value	Qty.	Value	Qty.	Value
	Short Tons	US$ 1,000	Short Tons	US$ 1,000	Short Tons	US$ 1,000
Albacore 1/	20,718.8	7,496.7	20,048.7	7,004.8	40,767.5	14,501.5
Yellowfin:						
Round	-	-	664.8	150.2	664.8	150.2
G. & G. 2/	36,272.9	12,197.9	8,377.0	2,516.8	44,649.9	14,714.7
Dressed	426.5	149.0	5,546.0	1,594.2	5,972.5	1,743.2
Fillets	4,228.8	1,642.2	1,067.7	312.6	5,296.5	1,954.8
Total	40,928.2	13,989.1	15,655.5	4,573.8	56,583.7	18,562.9
Big-eyed:						
Round	-	-	0.2	3/	0.2	3/
G. & G. 2/	369.0	99.6	3.0	0.7	372.0	100.3
Dressed	-	-	1,129.1	258.4	1,129.1	258.4
Fillets	29.0	9.0	195.0	42.3	224.0	51.3
Total	398.0	108.6	1,327.3	301.4	1,725.3	410.0
Skipjack 1/	326.1	84.3	1,080.7	166.6	1,406.8	250.9
Bluefin 4/	23.0	7.6	482.5	112.6	505.5	120.2
Loins:						
Albacore	725.8	584.6	-	-	725.8	584.6
Yellowfin	3,865.7	2,800.7	-	-	3,865.7	2,800.7
Big-eyed	360.8	226.8	-	-	360.8	226.8
Bluefin	133.4	89.6	-	-	133.4	89.6
Total	5,085.7	3,701.7	-	-	5,085.7	3,701.7
Grand Total	67,479.8	25,388.0	38,594.7	12,159.2	106,074.5	37,547.2

1/Round.
2/Gilled and gutted.
3/Less than $500.
4/Fillets.

Table 1 - Japanese Exports of Frozen Tuna and Frozen Tuna Products to the United States, 1962-1963 1/

Product	Direct Shipments		Increase or Decrease	Transshipments		Increase or Decrease	Total Shipments		Increase or Decrease
	1963	1962		1963	1962		1963	1962	
	(Short Tons)		%	(Short Tons)		%	(Short Tons)		%
Albacore	15,525	20,719	-25	23,127	20,049	+15	38,652	40,768	-5
Yellowfin	23,421	40,928	-43	7,343	15,655	-53	30,764	56,583	-46
Big-eyed	31	398	-92	285	1,327	-79	316	1,725	-82
Skipjack	70	326	-79	3,693	1,081	+342	3,763	1,407	+17
Bluefin 2/	-	23	-100	374	482	-22	374	505	-26
Loins	6,236	5,086	+23	-	-	-	6,236	5,086	+23
Total	45,283	67,480	-33	34,822	38,594	-10	80,105	106,074	-24

1/Exports in 1963 only include shipments to Canada. The quantity shipped to Canada is thought to be about 1.0 percent of the total.
2/Fillets.

Japan (Contd.):

over 1962 exports, which totaled 7,631 metric tons. The 1963 export price averaged US$377 a metric ton c.i.f., and reached a high of $470 a ton. Average export price in 1962 was $370 a ton. (Suisan Tsushin, January 10, 1964.)

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CANNED TUNA IN BRINE SALES TO UNITED STATES:

The Japan Canned Foods Exporter Association announced on December 18, 1963, that a total of 110,000 cases of canned tuna in brine for export to the United States would be offered at the first canned tuna sale of the new export year, but did not specify the quantity of white meat or light meat to be sold. (The new export year started December 1963.) Closing date for offers was set at December 22, with shipments to be made not later than February 22, 1964. Export prices per case (No. ½ 7-oz. 48's) are US$10.40 for white meat tuna and $7.80 for light meat tuna, both prices f.o.b. Japan. The sale of 4-pound cans of light meat tuna in brine is expected to be limited to a total of 12,000 cases of both A and B grade packs due to light supply. (Suisancho Nippo, December 19, 1963.)

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CANNED TUNA IN OIL EXPORTS, APRIL-OCTOBER 1963:

Data compiled by the Japan Canned Foods Exporters Association indicate that Japanese canned tuna in oil exports for April-October 1963 totaled 1,260,000 cases, an increase of 500,000 cases over the same period of 1962. October exports alone amounted to 260,000 cases. Principal countries of destination were reported as West Germany (430,000 cases) and Canada (160,000 cases). (Suisan Keizai Shimbun, December 26, 1963.)

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JAPANESE COMMENT ON CANNED TUNA MARKET TRENDS:

The Japan Canned Foods Exporters Association recently announced that because of low supply it would offer in the new market year at the first sale of canned tuna for export to the United States only a limited quantity of institutional-pack (4-lb.) light meat canned tuna. The Association is said to have received reports that institutional-pack light meat tuna is in very short supply in the United States. Reportedly, regular institutional-pack users, such as hotels, restaurants, and schools, are said to be finding it difficult to purchase 4-pound canned light meat tuna, and this has stimulated demand for that product.

On the other hand, canned white meat tuna, U. S. and Japanese, are said to be in abundant supply in the United States, with prices holding firm following a brief period of decline. The Canned Foods Association believes that, depending on strategy employed, it may be possible during the Lenten season to clear up the 800,000-1,000,000 cases of Japanese canned white meat tuna inventory carried over from 1963. (Suisancho Nippo, January 9, 1964.)

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CANNED TUNA PROMOTION IN UNITED STATES:

A total of US$250,000 has been budgeted for canned tuna promotion in the United States during the 1964 Lenten season by the Japan Canned Tuna Packers Association. This brings the total amount budgeted for canned tuna promotion in FY 1963 (April 1963-March 1964) to a total of US$500,000. Reportedly, based on Japanese production, this is equal to an assessment of approximately US$0.20 per case. This action was decided at a meeting of the Association on January 18. The Packers Association expected to meet with the Exporters Association to work out promotional details. (Suisan Tsushin, January 21, 1964.)

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HIGH PRICES PAID FOR FRESH TUNA IN TOKYO MARKET:

A record 3,700 yen per kilogram (US$4.66 per pound) was paid on January 4, 1964, at the Tokyo Central Fish Market for a 188-pound trap-caught bluefin tuna. This was equivalent to $9,320 a short ton. On the same day, a prime fresh bigeyed tuna sold for 2,000 yen a kilogram ($5,040 a short ton) and a prime yellowfin 1,500 yen a kilogram ($3,780 a short ton).

In December 1963, fresh prime bluefin frequently sold for prices ranging from $2.00-3.50 a pound (equivalent to $4,000-7,000 a short ton). The high prices were attributed to the short supply of prime fresh tuna for the sashimi (raw fish) trade and the strong holiday demand. (Suisan Keizai Shimbun, January 5, 1964, and other sources.)

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Japan (Contd.):

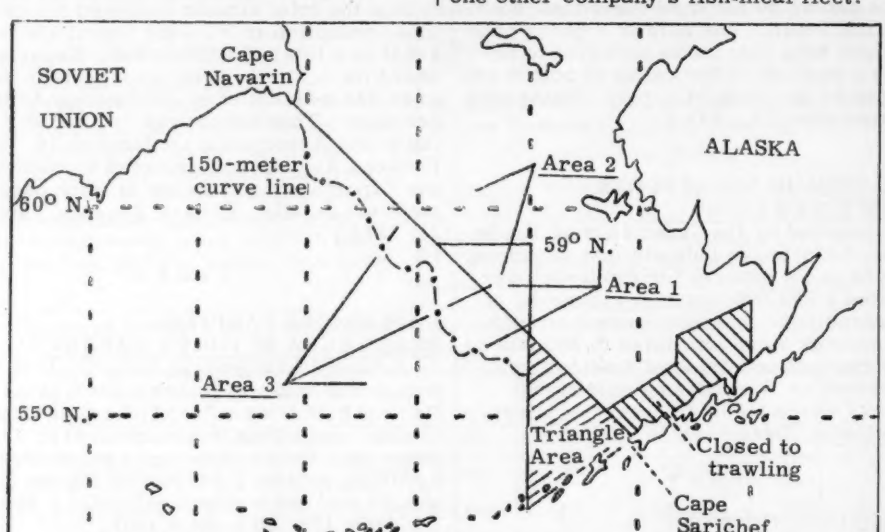
EASTERN BERING SEA MOTHERSHIP BOTTOMFISH AREAS FOR 1964:

The regulatory program proposal submitted by Japan's Fisheries Agency on the licensing and operation of mothership-type bottomfish fleets in the eastern Bering Sea in 1964 was reviewed and approved by the Japanese Central Fisheries Coordination Council on December 13, 1963. The main features of the 1964 regulatory program as contrasted to the 1963 regulations are: (1) reduction in bottomfish mothership fleets from a total of 19 to 14, and in catcher vessels from 252 to 228; (2) revival of a fishing firm's fish-meal operations; (3) simplification in area licensing system; and (4) relaxation of fishing restrictions, e.g., fleets permitted to operate over wider area.

Although the 1964 mothership-type bottomfish fleet has been reduced by a total of 5 motherships and 24 catcher vessels, the fishing capability of the fleet apparently has not been reduced due to the use of larger motherships and catcher vessels, not to mention the addition to the fleet of 2 large stern trawlers (Ibuki Maru and Taiyo Maru No. 82), which also will be serving as motherships.

In 1963, the 19 bottomfish motherships totaled 90,917 tons in gross weight. The 14 bottomfish motherships licensed to operate in the eastern Bering Sea in 1964 total 94,609 tons in gross weight, an increase of 3,692 tons.

The firm which pioneered the development of the mothership-type fish-meal operation in the Bering Sea and which voluntarily completely curtailed its Bering Sea fish-meal operation (two factoryships) in 1963 due to heavy financial losses it suffered in 1962 and in earlier years, has been authorized to revive its meal operation. The firm plans to use the 14,094-ton factoryship Renshin Maru. However, the operation of that firm's fish-meal fleet has been restricted to an area considered not as lucrative as the area assigned to one other company's fish-meal fleet.



Legend: Area 1: Area between 180° longitude and 170° W. longitude in waters less than 150 meters in depth, and area northeast of the line extending from Cape Sarichef, Unimak Island, to Cape Navarin (Navarin-Sarichef Line).
Area 2: Area northeast of the Navarin-Sarichef Line.
Area 3: Area southwest of the Navarin-Sarichef Line, and the Triangle Area bound by the Navarin-Sarichef Line, longitude 170° W., and latitude 59° N.

Japanese Bering Sea Bottomfish Fishing Areas, 1964.

Japan (Contd.):

The 1964 area licensing regulations have been simplified through the establishment of only three fishing areas. In 1963 the Fisheries Agency had established eight fishing zones in the eastern Bering Sea, which were designated by letters, as A, B, CF, DF, E, etc. As in 1963 there is considerable overlapping in the 1964 fishing areas.

The 1964 area licensing regulation, in summary, reads:

1. One mothership under 12,000 gross tons, accompanied by 30 catcher vessels of sizes 50-550 tons, shall be permitted to operate in the area between 180° longitude and 170° W. longitude in waters less than 150 meters in depth, and in the area northeast of the line extending from Cape Sarichef, Unimak Island, to Cape Navarin (Navarin-Sarichef Line).

2. One mothership under 15,000 gross tons, accompanied by 30 catcher vessels of sizes 50-550 gross tons, shall be permitted to operate northeast of the Navarin-Sarichef Line.

3. A total of 12 motherships, accompanied by a total of 168 catcher vessels of sizes 50-550 gross tons, shall be permitted to operate in the area southwest of the Navarin-Sarichef Line, and in the triangle area northeast of that line bound by said line and longitude 170° W. and latitude 59° N.

4. The area bound by the following lines shall be closed to trawling: Line extending from the northern coast of Alaska Peninsula at 160° W. longitude to the point 160° W. longitude-58°10" N. latitude, and connecting the points 160° W. longitude-58°10" N. latitude; 163° W. longitude-57°10" N. latitude; 163° W. longitude-56°20" N. latitude; and extending from the point 163° W. longitude-56°20" N.. latitude to the Navarin-Sarichef Line through the point 164° W. longitude-56° N. latitude.

For purposes of identification, the areas described in items 1 to 3 have been arbitrarily designated as Areas 1, 2, and 3. Fishing areas assigned to the 14 mothership fleets, their complement, type of operation, etc., as reported in several Japanese periodicals, are shown in table. The table does not include the Japanese mothership-type king crab fleet licensed to operate in Bristol Bay or a fishing company's two 1,500-ton stern trawlers (Akebono Maru Nos. 51 and 52) which operate independently in the eastern Bering Sea.

The operational plans submitted by the Japanese fishing companies planning to operate mothership-type bottomfish fleets in the eastern Bering Sea show several noteworthy trends. Those trends are: (1) decline in the number of long-line vessels and switchover to trawl vessels; (2) increase in size of catcher vessels; and (3) the use for the first time of large (over 2,500 tons) stern trawlers as motherships.

In 1963, the fleets operating long-line vessels, and particularly those which concentrated on fishing for halibut, reportedly had a poor season, whereas those which operated trawl gear had a successful season. Long-lining prospects for 1964 are considered poor, and catcher vessels operating long lines in 1964 are expected to total substantially less

Composition of Japanese Bering Sea Mothership-Type Bottomfish Fleet, 1964

Area of Operation	Mothership	Size	No. Catcher Vessels	Type of Operation	Period of Operation
		Gross Tons			
Area 1	Gyokuei Maru[1/]	10,357	30	Fish meal	Early April to early October
Area 2	Renshin Maru	14,094	30	Fish meal	Early April to early October
Area 3	Tenyo Maru[1/]	11,581	28	Trawl	Late April to early October
Area 3	Soyo Maru[1/]	11,192	28	Trawl	Late April to early October
Area 3	Shikishima Maru[1/]	10,144	24	Trawl	Early May to early October
Area 3	Seifu Maru[1/]	8,269	28	Trawl-longline	Late April to late September
Area 3	Einin Maru[1/]	7,482	15	Trawl	Early April to early October
Area 3	Chichibu Maru[1/]	7,420	12	Shrimp	Year round
Area 3	Itsukushima Maru[1/]	5,871	18	Trawl-longline	Early April to early October
Area 3	Taiyo Maru No. 82[2/]	2,890	1	Trawl	Mid-May to mid-October
Area 3	Ibuki Maru[2/]	2,500	1	Trawl	Starts mid-March
Area 3	Chichibu Maru No. 2[2/]	1,693	8	Trawl	Early May to late October
Area 3	Kotoshiro Maru No. 15[2/]	701	3	Trawl-longline	Early April to late October
Area 3	Seisho Maru No. 2	415	2	Trawl-longline	Unknown

1/Motherships which operated in Bering Sea in 1963.
2/Stern Trawlers.

Japan (Contd.):

than half the some 90 vessels which used that type of gear in 1963. As of mid-January 1964, operational plans submitted to the Fisheries Agency by the mothership companies indicated that about 20 catcher vessels will fish long lines this year. On the basis of that information, it appeared that at least four mothership fleets (Sifu Maru, Itsukushima Maru, Kotoshiro Maru No. 15, and Seisho Maru No. 2) will be fishing for halibut in the Triangle Area.

Although trawlers were much more successful than the long-line vessels, they had their share of difficulties in 1963, particularly the smaller draggers, because of bad weather early in the season. It became readily apparent that to operate successfully, larger trawlers would have to be used and the Fisheries Agency, in anticipation of that trend, apparently has placed a ceiling for the first time on the size of trawlers (maximum size 550 tons) that can be used as catcher vessels. As far as could be determined, there were no maximum size restrictions in previous years.

The trend towards using larger trawlers is seen, for example, in the case of one fishing company, in particular. In 1963, that company's mothership Chichibu Maru No. 2 operated with 80-ton class catcher vessels. During 1964 that mothership will be served by trawlers about 300 tons or over in size.

Operational plans of the different fleets at the beginning of 1964 further revealed that all fleets were planning to leave for the fishing grounds after early April. In 1963, a large percentage of the 19 fleets departed for the fishing grounds in March, and 1 or 2 of them left earlier, but many vessels lost fishing time due to bad weather during the early part of the season.

With regard to the operation of large stern trawlers, the Japanese Fisheries Agency had expressed the view in 1963 that, on the basis of available information, it appeared the operation of a mothership-type trawl fleet, composed of a large stern trawler fishing with several small trawlers, appeared to be the most efficient and economical way to fish the eastern Bering Sea. This year, for the first time, two stern trawlers over 2,500 tons (Ibuki Maru and Taiyo Maru No. 82), each fishing with a smaller trawler, are scheduled for operation.

In addition to those two large trawlers, another fishing company which has operated the two 1,500-ton stern trawlers Akebono Maru, Nos. 51 and 52, in the eastern Bering Sea for several years, is planning to replace them this fall with two 3,500-ton stern trawlers, which are now under construction and scheduled for completion in August 1964. (Japanese fishery periodicals.)

* * * * *

FISH-MEAL OPERATION IN EASTERN BERING SEA PLANNED:

The application of a Japanese fishing company to revive its fish-meal operations in the eastern Bering Sea is said to have been unofficially approved by the Fisheries Agency.

Japanese fish-meal factoryship Renshin Maru.

The company plans to assign the fish meal factoryship Renshin Maru (14,094 gross tons) to that operation. (Suisan Tsushin, January 10, 1964.)

* * * * *

PLANS FOR 1964 TRAWLER OPERATIONS IN EASTERN NORTH PACIFIC OCEAN:

The Japanese Fisheries Agency is reported to have informally approved the applications of two fishing companies to operate trawlers in the eastern North Pacific Ocean in 1964. It is reported that 1 of the 2 firms plans to operate a 1,500-ton trawler and the other firm a 500-ton trawler. Four other fishing companies which operated trawlers in the eastern North Pacific in 1963 are reported to be planning on using larger vessels in 1964. (Suisancho Nippo, December 23, 1963.)

* * * * *

FUTURE OF DISTANT-WATER TRAWL FISHERIES:

Production Chief Shunichi Oguchi of the Japanese Fisheries Agency made the following comments regarding the future of Japan's distant-water trawl fisheries:

Japan (Contd.):

Waters off West Africa: At the present time, Japanese trawlers are operating mainly in the waters off northwest Africa and, as a result, their catches must necessarily be landed at Las Palmas (Canary Islands). An important problem of the future is the expansion of new market outlets. As they are developed, they will lead to the gradual development of fishing grounds further to the south.

There is also need to develop the operational efficiency of trawl operations. In the past, the large trawlers hauled their catches back to Japan, but, at the present time, their catches are being transshipped to Japan. There should be further experimentation in making a clear separation between fish-catching and fish-transporting activities. If this is done, the trawl fishery off Africa can be developed further.

Northwest Atlantic: One large Japanese fishing company is operating the Tenyo Maru (3,500 gross tons) on an experimental basis but the Northwest Atlantic is an area fished by trawlers of many nations. Problems will be created if Japan should enter into competition with those countries in markets on which they are heavily dependent. Thus, Japan is presently collecting data on markets on which those nations are less dependent, mainly the United States.

Caribbean Sea: One Japanese firm operated one trawler Aoi Maru, 1,104 gross tons) in the Caribbean Sea on an experimental basis. Due to the vast area involved, there is still much to be learned about that area.

Waters off Argentina: For some time now we have had our eyes on those waters. However, due to the great distance of those grounds from Japan and to restricted market outlets, they have not been explored. This year two firms are conducting experimental fishing in those waters but it will be necessary for them to develop markets in Europe. Success of developing the grounds off Argentina will depend on finding market outlets.

Waters off New Zealand and Australia: They are not very attractive to fishermen, probably due to the lack of suitable fishing bases nearby. Those waters will continue to lack appeal unless suitable measures are developed with regard to catching and transporting fish.

Eastern North Pacific Ocean: Operation of Japanese trawlers in the waters southeast of the Alaska Peninsula is hindered by the fear (held by the United States and Canada) that halibut may be taken incidentally to other bottomfish. However, Japanese trawlers are taking almost no halibut in their nets, so there is room to expand further fishing effort in those waters.

Should we be provided with a share of the halibut catch, as we have been insisting at the treaty (United States-Canada-Japan) negotiations, and should this result in the establishment of restricted areas and in the prohibition of trawling operations, as in the Bering Sea, this will create problems. Our vessels will not be able to operate profitably if restricted areas to trawling should be established. It is not possible to visualize the future of this fishery without a clear idea of the outcome of the treaty negotiations. (Suisan Keizai Shimbun, January 1, 1964.)

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FISH-FREEZING OPERATIONS OFF ANGOLA PLANNED:

Preliminary discussion on the establishment of Japanese fish-freezing operations off Angola held between a Japanese fishing firm and Angolan Government officials were reported to have shown promise. The president of the Japanese firm was planning on leaving for Angola in mid-January 1964 for the purpose of completing the plans. The Japanese firm plans to operate off Angola a 6,800-ton freezer factoryship and 5 pairs of two-boat trawlers. (Suisan Tsushin, December 24, 1963.)

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WHALE OIL AND MEAT PRODUCTION, 1962/63 SEASON:

Japan's 1962/63 season's catch of whales produced 166,400 metric tons of oil and 168,323 tons of meat, according to whaling industry officials.

Table 1 - Japanese Whale Oil Production by Area, 1962/63 Season

Area	Baleen	Sperm	Total
	(Metric Tons)		
Coastal	2,500	8,000	10,500
North Pacific	11,966	20,320	32,286
Antarctic	113,334	10,380	123,614
Total	127,800	38,600	166,400

Table 2 - Japanese Whale Meat Production by Area, 1962/63 Season

Area	Baleen	Sperm	Total
	(Metric Tons)		
Coastal	10,000	1,200	11,200
North Pacific	20,052	2,000	22,052
Antarctic	133,987	1,084	135,071
Total	164,039	4,284	168,323

It was estimated that the 1963/64 season's catch for the Japanese whaling fleet operating in the Antarctic would produce 117,000 metric tons of whale oil and 125,000 tons of meat. The yield of other products e.g. bone meal, viscera, liver oil, and skin was not included in the information furnished by the Japanese whaling industry. (Fisheries Attache, United States Embassy, Tokyo, January 7, 1964.)

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BALEEN WHALE OIL SALES BY JAPANESE WHALING FIRMS:

Japanese whaling firms, which late in 1963 concluded the sale of 14,000 metric tons of baleen whale oil at £82 (US$229.60) per metric ton, are reported to have been offered £83 ($232.40) per metric ton by an independent fat- and oil-processing firm. (Suisancho Nippo, December 26, 1963.)

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ESTABLISHMENT OF FOREIGN-BASED WHALING OPERATIONS STUDIED:

Japanese whaling firms are reported to be actively conducting feasibility studies on the

Japan (Contd.):

establishment of foreign-based whaling operations. The studies are being undertaken to cope with the problem of fully utilizing their whaling vessels in the future in view of the likelihood that the international whale-catch quota will be further reduced. This would, in turn, necessitate a reduction in their Antarctic whaling opeations. The Japanese firms appear to be primarily interested in establishing whaling bases in African and South American countries. In 1963, Japanese whaling operations were established for the first time in South Georgia Island in the South Atlantic Ocean. One Japanese firm was reported to be planning on establishing whaling operations in Chile in early 1964. (Suisan Keizai Shimbun, December 19, 1963.)

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LICENSES TO OPERATE TWO WHALE CATCHER VESSELS OFF CHILE ISSUED:

Licenses were issued to a Japanese whaling company by Japan's Fishery Agency permitting it to operate two whale catcher vessels to hunt sperm whales in waters off the coast of Chile, according to the vice president of the whaling firm. The vessels are the No. 3 Ryhuo-Maru (429 gross tons) which arrived on the fishing grounds on December 31, 1963, and the No. 2 Seiho-Maru (306 gross tons) which was scheduled to join the other vessel on January 29, 1964. The licenses specify an operating period of about four months.

The whaling company official said that the catch target is 1,000 sperm whales, all of which are to be purchased by a Chilean firm which manufactures fish meal and oil. He stated further that the catcher boats will not make delivery to the land stations; instead, delivery to the Chilean firm will be made at sea. (United States Embassy, Tokyo, December 30, 1963.)

* * * * *

SPANISH TRAWL-CAUGHT FISH IMPORTED BY JAPANESE FIRM:

A Japanese fishing firm which has a five-year contract with Spain to purchase fish from Spanish trawlers based in the Canary Islands, imported 1,000 metric tons of Spanish-caught fish in January 1964. The fish, which are being transported to Japan on a Spanish vessel, consist mainly of "monko" squid and sea bream. It was the third shipment of fish that the Japanese firm imported. A fourth shipment, also of 1,000 tons, was scheduled for delivery in February.

In September 1963, the Japanese firm imported 200 tons of trawl-caught fish on a trial basis, and in October it imported 4,000 tons. The second shipment was transported to Japan by that company's 8,500-ton freezer factoryship, the Awazu Maru. (Suisancho Nippo, December 21, 1963.)

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EXPORTS OF FISHERY PRODUCTS, APRIL-SEPTEMBER 1963:

Data on Japanese exports of fishery products for FY 1963 (April 1963-March 1964) released by the Japanese Ministry of International Trade and Industry on December 9, 1963, indicate that exports during the first half of the fiscal year (April-September) totaled US$127,790,000. Exports of canned fishery products for the six months totaled 4,850,580 cases, valued at US$46,384,000, and exports of frozen fishery products totaled 83,221 metric tons, valued at $30,374,000. (Nihon Suisan Shimbun, December 11, 1963.)

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NUMBER OF SMALL VESSELS TO FISH IN NEW OFFSHORE TUNA FISHERY:

The Japanese Fisheries Agency announced on December 19, 1963, that at the recommendation of the Central Fisheries Coordination Council a total of 1,850 tuna vessels in the 20- to 50-ton class will be licensed to operate in the newly designated offshore tuna fishery (north of 10° N. latitude and west of 160° E. longitude). Vessel owners planning to engage in that fishery must submit their applications between December 25, 1963, and March 24, 1964. The Agency had earlier, on December 7, stopped receiving applications for permits to construct 39-ton tuna vessels. (Suisan Tsushin, December 20 and 27, 1963.)

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FISHING VESSEL CONSTRUCTION, JANUARY 1964:

On January 20, 1964, the Japanese Fisheries Agency licensed the construction of 23 fishing vessels (gross tonnage 12,695 tons). Included are 8 tuna fishing vessels of the following size classes: 250 tons, three; 192 tons, four; and 111 tons, one. The Agency also au-

Japan (Contd.):

thorized the construction of three large stern trawlers, one of 1,850 tons and two of 2,530 tons; and two 1,800-ton freezer vessels. (Suisan Keizai Shimbun, January 23, 1964.)

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PERMITS ISSUED BY FISHERIES AGENCY FOR VESSEL CONSTRUCTION, DECEMBER 1963:

The Japanese Fisheries Agency issued permits on December 16, 1963, for the construction of 46 fishing vessels. They included seven tuna long-line vessels: 1 vessel of 99 tons, 2 of 192 tons, one 300-ton tuna long-line training vessel, and one 888-ton portable-boat-carrying tuna mothership (Takamiya Maru), plus two 19-ton portable boats.

On December 26, the Agency issued construction permits for 96 fishing vessels. They included 22 tuna long-line vessels: one 19-ton portable boat, 5 vessels between 96-111 tons, eight 192-ton long-liners, and 8 vessels ranging in size from 253-324 tons. The Agency also authorized the construction of three 3,470-ton stern trawlers. (Suisan Keizai Shimbun, December 18 and 28, 1963.)

One of Japan's largest fishing companies has under construction two 2,800-ton stern trawlers, Taiyo Maru Nos. 81 and 82. The Taiyo Maru No. 81 was scheduled for completion in late February 1964, and was expected to be sent to the eastern North Pacific Ocean. (Suisancho Nippo, December 25, 1963.)

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BOTTOMFISH LONG-LINE FISHERY OFF NEW ZEALAND PLANNED:

A total of 17 Japanese fishing companies (including 6 tuna vessel owners) have submitted to the Fisheries Agency applications for permits to operate bottomfish long-line fleets in the waters directly north of North Island, New Zealand.

The 17 companies are planning on operating 300- to 1,000-ton vessels which would not directly engage in fishing but would deck-carry 1- to 2-ton unpowered boats which would do the actual fishing. The mothership fleets would fish about ten months of the year, except June and July, principally for red sea bream.

The interest of the Japanese fishing firms to engage in long-lining for red sea bream off New Zealand is based on the following reasons: (1) the distant-water mothership-type bottomfish long-line fishery, not to mention the distant-water trawl fishery, is one of the few remaining fisheries that can still be exploited and which shows promise; (2) fishing licenses are not presently required to engage in that fishery; (3) employment of tuna vessels retired from the tuna fishery and long-line vessels presently engaged in the Bering Sea bottomfish fishery is possible; (4) low cost of gear investment; (5) long-line gear fished at the bottom is highly selective, as revealed by experimental fishing conducted in New Zealand waters in 1961, thus making it possible to harvest red sea bream almost exclusively; and (6) ready market for red sea bream in Japan, which commands a high price. Current market price for red sea bream (heads-on) in Japan is quoted at about 150,000 yen (US$417) a metric ton, and is said to be comparable to that for dressed halibut.

The Fisheries Agency hopes to prevent severe gear competition on the New Zealand grounds. At the present time, the New Zealand offshore trawl fishery is regulated by the Agency as a "designated (licensed) fishery" but the bottomfish long-line fishery is not, and the Agency is said to be studying the possibility of regulating the long-line fishery as a "designated fishery." For the present, the Agency is said to be planning on restricting the operation of bottomfish long-line fleets to a total of 5 or 6 fleets. (Suisan Keizai Shimbun, January 10, 1964.)

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HIGH SPEED ENGINES FOR FISHING VESSELS RECOMMENDED:

The Japanese Fisheries Agency plans to install a high-speed Diesel engine in its new fishery research vessel Naikai Maru (80 gross tons) scheduled to be built in Fiscal Year 1964 (April 1964-March 1965) to determine its adaptability to Japanese fishing vessels. High-speed engines, widely used in fishing vessels of western countries, are not presently used on Japanese fishing vessels.

The recommendation for installation of high-speed engines in fishing vessels was made by officials of the Fisheries Agency and the Japan National Federation of Fishery Co-operative Associations, who during their tour of Europe in November 1963 observed that high-speed engines installed on fishing vessels resulted in considerably reducing manpower

Japan (Contd.):

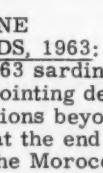
requirements. For example, a crew complement can be reduced to 4 or 5 on a 60-ton Japanese fishing vessel presently manned by 12-13 crew members. Other advantages are: (1) engineroom area can be reduced to allow more space for fish holds; and (2) engine operation can be controlled entirely from the wheelhouse. Possible disadvantages are: (1) high-speed engines must be replaced as a unit, whereas low-speed engines can be repaired in enginerooms, and (2) shorter period of serviceable life. (Suisancho Nippo, January 9, 1964.)

日本

Mauritius Island

JAPANESE TUNA TRANSSHIPMENT BASE AT PORT LOUIS:

The Japanese Overseas Company, which manages the tuna fishing base at Penang, Malaysia, has established an advance tuna transshipment base at Port Louis, Mauritius Island, in the western Indian Ocean, following approval granted by the Japanese Government on November 22, 1963. The Overseas Company presently has one 300-ton refrigerated vessel and one 400-ton carrier vessel based at that port, and hopes eventually to contract a total of 30 ice boats to fish out of its bases at Penang and Port Louis. At the present, five ice boats are operating out of Port Louis. Their ice supply is being transported to Port Louis from Penang. (Suisan Keizai Shimbun, December 26, 1963.)



Morocco

CANNED SARDINE MARKET TRENDS, 1963:

Morocco's 1963 sardine landings were reported as disappointing despite continuation of fishing operations beyond the season's normal closing at the end of September 1963. Spokesmen for the Moroccan fishing industry's merchandising organization and individual canners were inclined to blame the current sardine shortage on unusually bad weather conditions off the coast. Further observations were that the local fishing fleet is increasingly centered at Safi and Agadir and is handicapped in the search for more productive fishing grounds by limitations imposed by obsolescent boats and gear. Another explanation in connection with the present sardine shortage was the Moroccan fisherman's traditional reluctance to go long distances from the home port.

It was reported by authoritative sources that the canned sardine export program to which the industry is committed will exhaust inventories by April 1964.

The local industry has for some time been concerned with the static quality of its markets and the extent to which its narrow overall margin of profit depends on the duty-free import quota of 685,000 cases accorded by France. For these reasons, stocks on hand will be fully utilized in an effort to meet commitments, with the franc market favored if supplies run out.

Exports of canned sardines for the first four months of the season, June-September 1963, totaled 728,542 cases (100 cans No. ¼-4.5-oz.), compared with 733,574 cases in the same period of 1962. Of that total, 38.5 percent went to France, 22 percent to the other Common Market countries and Algeria, 14 percent to African countries which were formerly French territories, and the balance largely to Nigeria and other African markets in the sterling zone.

The target for the 1963 canned sardine pack was about 2,400,000 cases. Since exports tend to be fairly evenly spaced over the 12 months, with relatively little seasonal variation, the shortage expected to develop in April and May 1964 before new supplies become available can be estimated at 250,000 to 300,000 cases which is likely to be withheld from the West German and Italian markets.

The Moroccan canned sardine is a quality product packed for export under rigid control standards. But under present merchandising policies it has to compete in world markets on the basis of price rather than quality. The implicit disadvantage to that system is reflected in the fact that sales to any but the French market are at cost, if not at a loss. Various domestic considerations, including the large-scale unemployment elsewhere in the Moroccan economy, contribute to high prices for fish delivered to the canneries and high costs for labor in processing. While the Portuguese canned sardine industry is re-

Morocco (Contd.):

garded locally as the principal competitor determining world market prices, there is held to be no present prospect and little future prospect of meeting such competition. The exception might perhaps be the establishment of a much larger market than at present in the United States by packing a smaller sardine to meet United States consumer preferences.

The Norwegian brisling is by contrast not regarded by the Moroccan industry as being a competitor in quality terms except in the United States. The Moroccan industry would like to imitate certain Norwegian methods, especially in fishing operations, but considers that the capital investment required to modernize the fishing fleet is unavailable until more extensive markets are developed. (United States Consulate, Casablanca, December 11, 1963.)

Note: See Commercial Fisheries Review, January 1964 p. 64.

Netherlands

ANTARCTIC WHALING RESULTS, EARLY 1963/64 SEASON:

The management of the Netherlands Whaling Company in Amsterdam has released preliminary data on its 1963/64 Antarctic whaling expedition in which its factoryship, the Willem Barendsz, participated with 11 catcher vessels. The vessel started operations in the Antarctic on December 12, 1963, and up to January 5, 1964, the results were considered very disappointing. The data given in table 2 show the production as of January 5, 1964, as compared with the same period in the previous season.

Table 2 - Netherlands Whaling Company Production in Antarctic, December 12, 1963 to January 5, 1964

Product	Season	
	1/1963/64	1962/63
	(Metric Tons)	
Whale oil	1,421	3,742
Sperm oil	1,058	1,225
Meat meal	199	465
Frozen meat and liver	176	140
Frozen meat for Japanese refrigerator vessel	1,226	2,802

1/Preliminary.

At a stockholders meeting of the whaling company early in 1964, proposals were advanced to discontinue hunting for whales and to use the factoryship for another purpose, such as general fishing off the South American and African coasts. No decisions were made on the proposal.

As far as is known, 16 whaling expeditions were operating in the Antarctic during the 1963/64 season as compared with 17 in the previous season. They were the Netherlands with 1 factoryship, Norway 4, U.S.S.R. 4, and Japan 7.

Higher prices for fish meal and fish oil during the 1962/63 season resulted in a production value for the Netherlands Whaling Company of Fl. 13.1 million (US$3.6 million) as compared with Fl. 12.3 million ($3.4 million) in the previous season. This included the whaling company's share of the Japanese vessel's (Awazu Maru) operations which accompanied the expedition and froze 7,285 pounds of whale meat for the United Kingdom. It was reported that the Japanese vessel would again work with the Netherlands expedition during the 1963/64 season. The 1962/63 season was reported to have closed with a loss of about $400,000 to the Netherlands whaling expedition. (United States Consulate, Amsterdam, January 2 and 16, 1964.)

Note: See Commercial Fisheries Review, June 1963 p. 83.

Table 1 - Whale Products Produced by Netherlands Whaling Company in Antarctic and Average Prices Per Ton, 1961/62 and 1962/63 Seasons

Product	1962/63 Season			1961/62 Season		
	Metric Ton	Average Price Per Metric Ton		Metric Ton	Average Price Per Metric Ton	
		Fl.	US$		Fl.	US$
Whale oil	10,463	656	182	12,084	401	113
Sperm oil	2,905	867	241	2,915	769	214
Whale-meat meal	1,261	561	156	1,742	550	153
Frozen whale meat	795	779	216	1,220	808	224
Whale liver	344	905	251	417	909	253
Other whale products1/	60	-	-	31	-	-
Whale meat for Japanese refrigerator ship	7,285	-	-	7,936	-	-

1/Whale bones, sperm whale teeth.

Norway

CANNED FISH EXPORTS, JANUARY 1-OCTOBER 26, 1963:

Norway's total exports of canned fish in January 1-October 26, 1963, were 8.5 percent less than in the same period of 1962. The decline affected all of Norway's principal canned fish products. There was a particularly sharp decline in shipments to the United States due in large part to the recovery of the Maine sardine industry which recaptured a good part of the United States market for canned sardines.

Norwegian Exports of Canned Fish, January 1-October 26, 1962-63

Product	1/1963	1962
	(Metric Tons)	
Brisling	4,437	5,100
Small sild	11,779	12,010
Kippered herring	2,570	3,576
Soft herring roe	672	739
Sild delicatessen	396	439
Other canned fish	2,702	2,646
Shellfish	1,272	1,544
Total	23,328	26,054

1/Preliminary.

In 1963, the small sild-canning season opened on May 2. By November 23, 1963, the small sild pack amounted to 679,717 standard cases, compared with 663,283 cases in the same period of 1962.

The 1963 brisling packing season extended from June 4 to October 15. At the close of the 1963 season, a total of 282,039 standard cases of canned brisling had been packed, a decline of 32.5 percent from the pack of 417,918 cases in the previous year. The Norwegian brisling catch was rather poor in the fall of 1963.

The production of canned mackerel up to November 16, 1963, amounted to 1,577 metric tons, compared with 2,194 tons by the same date in 1962. (Norwegian Canners Export Journal, December 1963.)

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FISHERIES LANDINGS AND EXPORTS, 1963:

Norway's fisheries landings in 1963 amounted to 1,138,105 metric tons with an ex-vessel value of Kr. 685 million (US$96 million), according to preliminary estimates. The 1963 landings were up about 1.8 percent in quantity and 3.0 percent in value from those in the previous year.

Norwegian exports of fishery products in 1963 were valued at Kr. 970 million (US$136 million), an increase of Kr. 25 million (US$3.5 million) from those in 1962. (News of Norway, January 9, 1964.)

Pakistan

NEW FISH-PROCESSING PLANT ESTABLISHED AT KARACHI:

A new fish-processing plant in Karachi, Pakistan, was to start processing fishery and fishery byproducts by March 1964. The plant is built along modern lines with the latest freezing and processing facilities for processing shrimp, fish fillets, and other fishery products, as well as the manufacture of shark-liver oil.

The Karachi fish harbor and market was built by the Pakistan Government and started operating in late 1959. Since then it has become an important fisheries center and has given impetus to the growth of West Pakistan's fisheries. A certain amount of space at the market area was set aside for private industry and as of the end of 1963 a number of firms have located there with processing equipment to freeze, can, and dry fish, and also extract shark-liver oil.

Poland

TRAWLING OPERATIONS IN THE NORTHWEST ATLANTIC:

Polish factory-trawlers operating in the Northwest Atlantic off Newfoundland and Labrador in 1963 reported average daily catches of 31 metric tons. One of the vessels caught 6,400 metric tons of cod, ocean perch, and flatfish in 1963. The Polish trawlers began deep-water operations in 1963, operating at depths of 550 to 700 meters (1,800 to 2,300 feet.) (Polish Maritime News, December 1963.)

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TRAWLING OPERATIONS OFF NORTHWEST AFRICA:

In early November 1963, the Polish factory trawler Pegaz landed 1,270 metric tons of fish at Tema, Ghana. The Pegaz and 11 Polish mo-

Poland (Contd.):

tor trawlers are based at Tema, Ghana, where their catch is landed and sold. The vessels are said to be taking good catches from fishing grounds off Northwest Africa. (Polish Maritime News, December 1963.)

Portugal

AFRICAN TRAWLING FLEET MAY BE SERVICED BY MOTHERSHIP:

Portuguese trawlers operating off Northwest Africa have recently had to move farther south to find fish. The added distance and lack of refrigeration on the fishing vessels has created problems. Now, however, the Gil Eanes, a refrigerated supply ship, will be available to pick up the catch of the African fleet during part of the year. In the past, the Gil Eanes has been used exclusively to service the Portuguese Northwest Atlantic cod-fishing fleet of about 75 vessels. The supply ship has normally remained in the Northwest Atlantic about six months each year providing equipment and welfare services to the 6,000 fishermen of the cod fleet. New legislation (Decree-Law No. 45,496) enacted December 30, 1963, makes the Gil Eanes available for charter to other registered vessel operators when it is not working in the Northwest Atlantic. (United States Embassy, Lisbon, January 20, 1964.)

Rumania

TWO NEW FREEZER STERN TRAWLERS ORDERED FROM JAPAN:

The Rumanian state-owned fishing industry is planning to extend its operations into the western Atlantic Ocean (off Newfoundland) and into the equatorial Atlantic (off the West African coast) in 1964. Two large stern trawlers have been ordered from Japanese shipyards at Hitachi, the first of which was scheduled for delivery in December 1963. The second vessel will be delivered some time during 1964. The vessels are 305 feet long with a displacement of 3,800 gross tons and a speed of 13 knots. They will have a freezer-hold capacity of 58,269 cubic feet and a fish-meal-hold capacity of 18,187 cubic fleet. The vessels will be capable of remaining at sea 100 days. (Le Marin, November 15, 1963.)

South Africa

TUNA COMPANY EXPANDING FISHING FLEET:

In late 1963, a South African tuna-fishing company was negotiating in Copenhagen, Denmark, for the purchase of 2 more ocean-going vessels at a cost of R220,000 (US$306,680). The new vessels will each have a refrigerated storage capacity of 60 to 70 tons of fish. The South African company was formed in Cape Town in mid-1963. It began tuna fishing operations off the west coast with the Marinette, a converted refrigerated cargo vessel which was outfitted for both long-line and pole-and-line fishing. The success of the Marinette led to the negotiations for the new vessels. (South African Fishing News and Shipping Industry Review, November 1963.)

Note: See Commercial Fisheries Review, November 1963 p. 78.

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FISH MEAL EXPORT QUOTA FOR 1964 INCREASED:

A 1964 fish meal export quota of 300,000 short tons has been assigned to South Africa (including South-West Africa) by the Fish Meal Exporters' Organization (FEO). This is 75,000 tons above South Africa's 1963 export quota. (In late October 1963, FEO met in Lima, Peru, and assigned 1964 fish meal export quotas for its five member countries--Angola, Iceland, Norway, Peru, and South Africa.)

In 1963, South Africa produced about 120,000 tons of fish meal while the Territory of South-West Africa produced about 140,000 tons, for a total of 260,000 tons. Only about 25,000 tons were consumed domestically, leaving 235,000 tons available for export.

South-West Africa's fish catch quota, which is set by the Government, has been increased from 600,000 tons in 1963 to 720,000 tons this year, and it is expected that the Territory's factories will again emphasize fish-meal production. (Fish canned, in contrast, was cut back from just over 2,000,000 cases in 1962 to 1,900,000 cases in 1963.) The increased

South Africa (Contd.):

quota from FEO will help absorb any surplus resulting from the larger catch.

About 60 percent of South African and South-West African estimated fish-meal production for 1964 has already been sold on future contracts at prices slightly above current rates, according to the chairman of the South African Fish Meal Producers' Association. Selling has now been stopped to await market developments. (United States Consul, Cape Town, January 14, 1964.)

South-West Africa

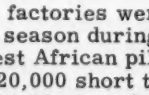
PILCHARD SEASON IN 1963 SETS RECORD:

The last of the six pilchard-processing factories at Walvis Bay in South-West Africa completed operations during the second week of November 1963. This was the best pilchard season yet at Walvis Bay with more than 600,000 short tons of raw fish landed.

The approximate production at Walvis Bay during the 1963 season was: fish meal, 140,000 short tons (an all-time record)--last season the production was 95,000 short tons; fish oil, 4 million imperial gallons--was less than in 1962 when the record production reached 4.5 million gallons.

The canned fish pack dropped in 1963 to 1.9 million cases in comparison with just over 2 million cases in the 1962 season.

Most of the factories were expected to start the 1964 season during February. The total South-West African pilchard quota for 1964 will be 720,000 short tons. (The South African Shipping News and Fishing Industry Review, December 1963.)



Spain

FISHERIES DEVELOPMENT PLAN, 1964-1967:

The Spanish Government's comprehensive Economic and Social Development Plan for 1964-1967 went into effect January 1, 1964. The Plan places heavy emphasis on investments as the key to increased output and productivity.

The main goals for the Spanish fishing industry in the 4-year Plan are: (1) improve the fishing fleet by replacing 44,000 metric tons of obsolete vessels with 42,000 tons of new construction--vessels less than 25 years old are expected to make up 453,000 gross tons of the Spanish fleet in 1967; (2) to equip fishing harbors; and (3) to modernize the fish-canning and preserving industries, improve fish marketing, and increase consumption of fishery products.

Spanish canned production in 1967 is expected to be 60.9 percent greater than in 1962; domestic consumption of canned fishery products should be 41.5 percent above the 1961 level, and exports should be 134.9 percent above 1961.

Salted fish production should increase by 50 percent during the 1962-1967 period. It is hoped that production costs will decline with greater mechanization and expanded capacity.

A special plan has been designed for the Canary Islands calling for an annual growth rate of 11.6 percent in the fisheries of that territory. (United States Embassy, Madrid, January 3, 1964.)

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FISHERY TRENDS AT VIGO AND LA CORONA, OCTOBER-DECEMBER 1963:

Vigo Landings and Prices: Fishery landings at the port of Vigo, Spain, in October-December 1963 totaled 20,599 metric tons valued at 268.3 million pesetas (US$4.5 million), a considerable decline from third quar-

Table 1 - Landings and Average Ex-Vessel Prices of Selected Species at Vigo, October-December 1963 with Comparisons

Species	1963						1962		
	October-December			July-September			October-December		
	Quantity	Average Price		Quantity	Average Price		Quantity	Average Price	
	Metric Tons	Pesetas/Kilo	US¢/Lb.	Metric Tons	Pesetas/Kilo	US¢/Lb.	Metric Tons	Pesetas/Kilo	US¢/Lb.
Small hake . .	4,675	25.50	19.3	4,550	25.45	19.3	2,363	25.79	19.5
Sardines . . .	3,359	8.09	6.1	4,414	7.07	5.4	5,066	6.53	4.9
Horse mackerel	3,034	4.14	3.1	4,394	3.33	2.5	4,777	4.61	3.5

Spain (Contd.):

ter 1963 landings of 30,122 tons valued at 404.4 million pesetas (US$6.7 million), and fourth quarter 1962 landings of 25,428 tons valued at 245.8 million pesetas (US$4.1 million).

Table 2 - Distribution of the Fishery Landings at Vigo, October-December 1963 with Comparisons

Period	Shipped Fresh to Domestic Markets	Canned	Other Distribution (Smoking, Drying, Fish Meal, etc.)
	(Metric Tons)		
4th Quarter 1963	12,020	5,364	3,215
3rd Quarter 1963	13,786	10,117	6,219
4th Quarter 1962	12,882	7,115	5,431

A drop in landings at Vigo during the last three months of the year is expected. The end of the albacore season and dwindling sardine landings are the main reasons for the decline, but other species are also affected. The offshore fleet is often inactive in winter because of bad weather.

Total fishery landings at Vigo during 1963 were up 15.8 percent in quantity and 41.7 percent in value from 1962 (which was also a record year).

Table 3 - Fishery Landings at Vigo, 1959-63

Year	Quantity	Value	
	Metric Tons	1,000 Pesetas	US$1,000
1963	91,882	1,261,424	21,036.8
1962	79,344	890,449	14,850.0
1961	74,810	723,033	12,058.0
1960	65,457	660,645	11,017.6
1959	75,179	759,661	12,668.9

La Coruna Landings and Prices: Fishery landings at the port of La Coruna in 1963 were reported to be about 75,000 metric tons (including cod landings) with an ex-vessel value of almost 1,200 million pesetas (US$20.0 million). About 11,000 metric tons of the La Coruna 1963 landings were sold to canneries, and about 70 percent of the landings (excluding cod) were shipped fresh to domestic markets.

Canned Fish Industry: Difficulties were reported in the canned fish industry at Vigo and La Coruna during October-December 1963. Canned fish production was down considerably from that in the preceding quarter as well as from that in the fourth quarter of 1962 (table 2). All canneries were said to have large stocks on hand. A serious decline in canned fish exports has been only partly offset by improved domestic sales. There is a growing sense of concern among all but the strongest firms.

Some relief may be obtained if the Government authorizes the export of canned fish packed in peanut oil. However, it is thought that the industry needs a thorough reorganization, including new machinery and equipment, new production methods, and possibly some consolidation of producers. (United States Consul, Vigo, January 16, 1964.)

Note: 59.96 Spanish pesetas equal US$1.00.

Taiwan

FISHERIES TRENDS, 1963:

Production: Taiwan's fisheries production in 1963 was up 7.2 percent from that in 1962. The increase in production from deep-sea fisheries was mainly due to a good trawling

Taiwan's Fisheries Production, 1962-63

Type of Fishery	1963	1962
	(Metric Tons)	
Offshore and deep-sea fisheries	119,880	113,595
Inner coastal fisheries	144,023	132,525
Outer coastal fisheries	36,854	32,286
Fish culture	49,972	48,640
Total	350,729	327,046

catch, and the addition of 12 tuna long-line vessels constructed under a loan extended by the Taiwan Joint Commission on Rural Reconstruction (JCRR). Increases in coastal fisheries were due to good runs of fish and the growth of a motorized fleet of small vessels. The drop in production from fish culture was the result of the summer drought and the cold weather in the spring which killed many fish.

Two of Taiwan's new 210-ton tuna long-line vessels sail on their maiden voyage.

Taiwan (Contd.):

Artificial Hatching of Carp: In July 1963, three species of Chinese carp (Hypophthalmichthys molitrix, Aristichthys nobilis, and Ctenopharyngodon idellus) were given pituitary hormone injections to stimulate spawning. The majority of the eggs obtained from the hormone-treated fish were fertilized and hatched normally and the young fish obtained by that method grew normally. It appears that this may be an economical way to solve the difficult problem of hatching carp. Chinese carp fingerlings had to be imported from Hong Kong in past years.

Artificial Hatching of Mullet: The grey mullet (Mugil cephalus) is an important pond fish in Taiwan, but fingerlings for stocking local ponds must be captured in coastal water, and the supply is often inadequate. In December 1963, a team of fish culturists tried to fertilize eggs obtained from ripe mullet captured off the southern coast of Taiwan. The male and female mullet were first given hormone injections. The eggs obtained by stripping were fertilized with milt from the male and hatched in 60 hours. However, all the fry thus obtained died in 2 or 3 days. The experiment will be continued in late 1964 when mullet start their spawning migration off the southern coast of Taiwan. (T. P. Chen, Chief, Fisheries Division, Joint Commission on Rural Reconstruction, Taiwan.)

Note: See Commercial Fisheries Review, April 1963 p. 74.

U. S. S. R.

NEW SERIES OF FREEZER-TRAWLERS UNDER CONSTRUCTION IN DENMARK:

The M/S Grumant, the first of the new series of four identical freezer-trawlers ordered from a Copenhagen shipyard by V/O Sudoimport, of Moscow, was launched December 18, 1963. The contract for the 4 vessels amounts to a total of Kr.95 million (US$13.7 million), and calls for delivery in 1964. The M/S Grumant was built as a refrigerator ship to dress and freeze catches taken aboard from accompanying trawlers. However, it also may be operated as a stern trawler. Specifications are as follows: length between perpendiculars 91 meters, breadth 16 meters, depth to upper deck 8.6 meters, deadweight (approximate) 2,550 metric tons, draft (approximate) 5.52 meters, speed on loaded trials 14.0 knots. The Grumant is driven by a 6-cylinder Diesel engine developing 3,530 horsepower at 200 r.p.m.; auxiliary power is provided by three 6-cylinder and one 3-cylinder Diesel engines.

Fig. 1 - Bow view of M/S Grumant at construction dock.

The M/S Golfstrim, the second vessel of the new series, was launched on January 16, 1964.

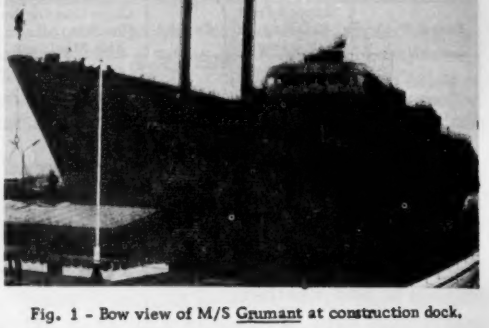

Fig. 2 - Stern of M/S Grumant. Note chute for hauling aboard trawl catches.

An earlier series of 4 identical vessels was delivered by the Copenhagen shipyard to V/O Sudoimport in November 1962 and January, June, and September 1963. The first series of four vessels had identical specifications to the M/S Grumant and M/S Golfstrim, except that the individual tonnage of the earlier vessels was given as 2,600. It was also stated that the first series of vessels would freeze fish only and not do any trawling.

U. S. S. R. (Contd.):

The M/S Grumant has propulsion machinery as well as the refrigerating plant located amidships, with large refrigerated cargo holds fore and aft. The entire superstructure is arranged amidships. The stern includes a large chute for taking catches aboard.

The rigging consists of two pairs of self-supporting derrick posts. On the superstructure, there is a self-supporting combined signal and radar mast. The derricks (four 3-ton and two 7-ton) are served by four 3-ton and two 5-ton winches. The deck machinery also includes an anchor winch, two 3-ton warping winches, and one 15-ton trawl winch.

Construction time for the M/S Grumant, from keel laying to the assembly of the final section, was only 15 working days. This was 4 days faster than the 19-day record set in constructing the M/S Vitrus Bering, of the first series, in June 1962. The M/S Grumant was built in five main sections--keel, section forward of mast, bow, stern and superstructure--which were welded ahead of time, held in the section warehouse, and then assembled in a drydock. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, January 22, 1964.)

Note: See Commercial Fisheries Review, Sept. 1962 p. 71.

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NEW POLISH-BUILT FACTORYSHIP DELIVERED:

A well known Copenhagen ship and engine builder announced on December 2, 1963, that 1 of its engine licensees, a shipyard in Gdansk, Poland, had delivered the first of a series of 11 factory vessels (a new type known as B-64) to the Soviet fishing fleet.

The new vessel is intended to fulfill the function of a factory-base ship on the Atlantic grounds in close cooperation with fishing fleets. In addition to processing and storing fish, the factoryship will (1) supply fishing flotillas with oil, water, fishing gear, and provisions; (2) render technical assistance to fishing units; (3) render social and medical service to fishing vessel crews; and (4) command the whole fishing fleet while operating on the fishing grounds.

The dimensions of the vessel are: length (over-all) 542 feet, breadth 69 feet, depth to main deck 31 feet, depth to shelter deck 41 feet, deadweight tonnage 10,000 metric tons, gross tonnage 9,250 tons, and net tonnage 3,660 tons.

The vessel is driven by a 5-cylinder Diesel engine which develops 6,250 horsepower at 115 r.p.m. Service speed was reported as about 14 knots.

The vessel has holding areas with the following capacity: cold-storage holds 10,530 cubic meters, provisions chambers 300 tons, fuel oil tanks 46,660 cubic meters, fresh water tanks 1,900 cubic meters, oil tanks 200 cubic meters, and cod-liver oi tanks 230 cubic meters.

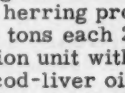
The vessel has a shelter-deck design with a long forecastle, superstructures fore and aft, and single compartment unsinkability. Processing is carried out between decks. Fresh fish is received on the vessel in net bags (floating cod ends) that are pulled up the stern ramp by two-ton winches. Catches may also be transferred from fishing vessels alongside by derricks of 5-ton and 10-ton capacity. Fuel oil and water for fishing vessels are carried in deep tanks and double bottom tanks. The stern upper-deck superstructure has space for an airplane or a helicopter. The hull is reinforced for navigation in ice. All holds are equipped to store frozen fishery products at -25° C. (-13° F.). Both the mooring and anchoring appliances are adapted to anchor the vessel in deep water. Special aids will allow simultaneous mooring of four fishing vessels alongside the mothership. It has accommodations for 248 persons in single, 2- and 4-berth air-conditioned cabins. The vessel is equipped to provide medical service to fishing fleet crews. The vessel carries 2 salt-water evaporators with a total capacity of 100 tons per day to provide fresh water for a fishing fleet.

The vessel's refrigeration equipment has the capacity to : (1) freeze 100 tons of fish per day in blast-freezing tunnels; (2) produce 20 tons of flake ice per day; (3) maintain a temperature of -25° C. (-13° F.) in all holds; (4) maintain appropriate temperatures in provisions chambers; and (5) maintain required air-conditioning.

Two processing rooms on the main deck can handle 200 tons of fish per day. Six fully mechanized processing lines are designed to produce fish fillets, herring preserves, and

U.S.S.R. (Contd.):

salted herring. Fish-processing equipment includes filleting machines and canning machinery. The 3 herring processing lines have a capacity of 50 tons each 22 hours. There is a fish reduction unit with daily capacity of 100 tons. The cod-liver oil plant can produce 5 tons of oil daily. Fish products are mechanically conveyed from the processing rooms to storage holds. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, January 15, 1964.)



United Arab Republic

FISH CANNING:

The only important fish cannery in the United Arab Republic is located near the mouth of the river Damietta (branch of the Nile) on the Mediterranean Coast in the town of Ezbet el Borg. The cannery, which became fully operative late in the spring of 1962, includes a can manufacturing section and a fish meal and oil processing unit. At present, the plant is concentrating on sardine canning. From September to November, the Mediterranean sardine season, the factory receives sardines directly from fishing vessels arriving at the company's dock. During the rest of the year, fresh sardines are trucked from Suez.

The factory is fully equipped to handle all stages of sardine canning. The canning equipment was manufactured and installed by a Japanese firm. Japanese technicians assisted at the initial pilot production, but present operations are under the supervision and maintenance of Egyptian engineers working in the plant. All operations are done by machine, except for cutting the fish and filling the cans which are manual. The plant employs about 400 full-time workers. This includes 300 women who process the fish on the production lines.

Canned sardine production during fiscal year 1964 is expected to reach 15,000 metric tons or about 7 million 4.4-oz. cans, compared with 2.5 million cans in FY 1963. The large increase in sardine production is expected because of the smoothing out of earlier production difficulties, and to the fact that facilities formerly devoted to crab and shrimp canning will be available for work on sardines.

The plant processes "musa," a small fish taken along with sardines. Production figures are inexact because "musa" is considered a byproduct of the sardine industry, but the manager expected that about 1 million 4.4-oz. cans of "musa" would be processed during FY 1964 for retailing on the local market at 5 piasters (11.5 U.S. cents) per can.

Although sardines are canned chiefly for domestic consumption, small amounts are being exported to Ghana, the Congo, and Kuwait. No increase in those exports is expected in the immediate future.

A total of 750,000 3.5-oz. cans of shrimp were produced during FY 1963. Shrimp are not being processed this year. The company has been exporting about 500,000 cans of shrimp each year to East Germany, and will continue to do so until stocks are exhausted. The resumption of shrimp production is not planned unless a firm export market develops.

The cannery produced 30,000 7-oz. cans of crab during FY 1963. No crab production was reported for FY 1964. All crab production is consumed locally.

The company will process 100,000 2-oz. cans of anchovies during FY 1964.

The plant management is considering importing frozen tuna from Japan for canning. Negotiations for machinery are under way, and the plant laboratory is conducting feasibility research. If arrangements are successful, the factory plans to produce 300,000 3-1/2-ounce cans and 200,000 7-1/2-oz. cans of tuna annually.

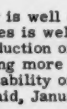
According to the plant management, the possibility of exporting canned shrimp to the United States is being discussed with a shellfish company in Mississippi. The Mississippi company would supply the empty cans, and then buy the canned shrimp packed at the Egyptian factory.

Retail prices on the local Egyptian market are:

Item	Unit	Price	
		(Piasters 1/)	(U.S. Cents)
Shrimp	3.5-oz. can	15	34.5
Crab	7.0-oz. can	20	46.0
Sardine	4.4-oz. can	5.5	12.7
Musa	4.4-oz. can	5	11.5

1/One Egyptian piaster equals US$0.023.

The Damietta cannery is well organized and managed. The equipment on the premises is well maintained. Elimination of hand operations by introduction of more automatic machinery would make the processing more economical, but such expansion must await the availability of foreign exchange. (United States Consulate, Port Said, January 24, 1964.)



United Kingdom

FISHERY LOANS INTEREST RATES REVISED:

The British White Fish Authority announced that effective November 16, 1963, their rates of interest on loans for fishing vessels of not more than 140 feet, new engines, nets and gear would be as follows: on loans for more than 5 years but not more than 10 years, $5\frac{5}{8}$ percent (increase $\frac{1}{8}$ percent); on loans for more than 10 years but not more than 15 years, $5\frac{5}{8}$ percent (increase $\frac{1}{4}$ percent); on loans for more than 15 years but not more than 20 years, $5\frac{7}{8}$ percent (increase $\frac{1}{4}$ percent).

The rates on loans made before November 16 are unchanged.

Note: See Commercial Fisheries Review, January 1964 p. 71.

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TRAWLER FISHERMEN GET MORE PAY AND ADDITIONAL PAID HOLIDAYS:

More pay and additional paid holidays for British trawler fishermen were issues agreed upon at a meeting in London of the National Joint Industrial Council which represents vessel owners and unions in the British fishing industry. The new pay agreement was to become effective November 25, 1963. The fishermen are getting an extra one shilling

United Kingdom (Contd.):

(14 U. S. cents) on the basic rates, and three more paid holidays bringing the annual holiday leave up to 24 days.

After the meeting, an employee spokesman who is also National Fishery Officer of the Transport and General Workers' Union (TGWU) stated that the leave agreement was among the best negotiated in British industry. A Fleetwood official of TGWU described the increase as not being as much as they had expected but that it was a step in the right direction.

At Aberdeen, an official of the Aberdeen Fishing Vessel Owners' Association said the increased rate will cost trawler owners there another £20,000 to £25,000 (US$56,000 to $70,000), or about £250 ($700) per vessel. He added that the fishermen had wanted 28 days leave but that under the new agreement they would get 24 days leave with pay.

Vessel owners in Lowestoft were expected to hold a meeting before the pay increases became effective in order to discuss the implications of the decisions made at the November London meeting.

At Hull, the pay increase will affect about 3,000 fishermen. Also, about 2,500 workers employed either on the Hull Fish Market or in dock-processing establishments were to get a shorter working week with increased minimum rates of pay. Effective on April 6, 1964, the working week will be reduced from 44 hours to 42 hours. This was based on agreements negotiated between the Hull Fish Merchant's Protection Association and Union representatives. New minimum pay rates were to be effective in the first full pay week following November 11, 1963. Minimum pay rates for men 20 years of age and over were to be increased by seven shillings (98 U. S. cents), with proportionate increases for youths and boys. Separate classifications of skilled and unskilled for women have been combined, and the new rate for women 20 years of age and over will be £6 10 shillings ($18.20) a week, with proportionate increases for those under 20 years of age. (Fishing News, November 15, 1963.)

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BOXING-FISH-AT-SEA TESTS CARRIED OUT BY TRAWLER:

The British trawler St. Britwin was slated to return to her home port of Hull in December 1963, following a fishing trip in which fish-boxing tests aboard the vessel were carried out. On this experimental trip the vessel also carried aboard, in addition to her normal crew, members of the White Fish Authority's Industrial Development Unit who were sponsoring the boxing-fishing-at-sea tests.

There have been occasional experiments in fish boxing aboard distant-water trawlers but these have been on a relatively small scale and have had as their primary aim an assessment of the quality of boxed fish. Now, as the scope of the boxing at sea is becoming enlarged, the purpose of this bigger scale work is to gain practical experience of what is entailed both at sea and in port unloading operations.

It is stressed, however, that on this occasion, neither the type of box to be used nor the method of marketing, involving as it will sample weighing, will necessarily be the final procedure to be adopted.

The present practice of conventional distant-water trawlers is to stow catches in ice in the fish hold but a report on the subject has pointed out advantages which the extension of the boxing technique would give.

Boxing fish at sea, it was stated, besides cutting out considerable intermediate fish handling, would have the further advantage of preventing the earlier and later parts of a vessel's catch being accidentally mixed during unloading.

In discussing the present boxing experiments, the head of the Industrial Development Unit expressed appreciation of the help which the Torry Research Station, the Humber Laboratory of the Department of Scientific and Industrial Research, and others were giving on the tests.

"One of the advantages of boxing fish," he said, "is that it enables fish to be displayed in more or less the order in which it has been caught." (Fishing News, November 15, 1963.)

* * * * *

NEW FROZEN FISH THAWING UNIT:

A new thawing plant operating at Grimsby, England, is an essential part in a plan to freeze fish at sea and then thaw and fillet ashore to meet specific requirements. The goal is an end-product with all the physical characteristics of fresh fish in prime condition.

United Kingdom (Contd.):

The new thawing plant was designed to accommodate the 100-pound (42 by 21 by 4-inch) blocks of whole fish now being produced by certain freezer-trawlers. The

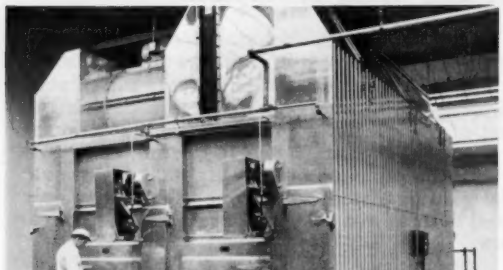

Fig. 1 - New frozen fish thawing unit operating in Grimsby.

thawing unit is, in effect, a large box (16 by 26 feet at the base), fitted at each end with entry doors and flap-sealed horizontal openings for the entry and removal of fish. It contains an insulated thawing chamber and the high velocity fans, heater units, and humidifiers of the thawing equipment. The thawing chamber is lined with zinc-sprayed, rust-proofed steel sheeting, and is equipped with twin five-tier noncorrosive endless rubber belts which carry the fish.

The whole fish blocks are fed on to the moving belts by roller conveyors. The fish

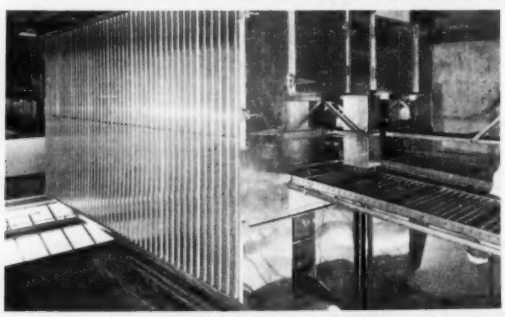

Fig. 2 - Shows the twin roller conveyors by which 100-pound frozen fish blocks enter the thawing chamber. Housed in the upper half of the structure are high velocity fans, and equipment regulating heat and humidity.

blocks are thawed in four hours by a combination of high velocity air, temperature, and humidity--all critically regulated, integrated, and timed. After thawing, the fish blocks emerge as individual fish ready for filleting. The unit can produce 1 to 1½ tons of thawed fish per hour.

Fig. 3 - Frozen blocks of whole fish entering thawing unit.

The thawing unit's cycle speed of 4 hours represents a belt speed of 5 inches per minute. This can be varied to suit blocks of greater or lesser thickness than four inches.

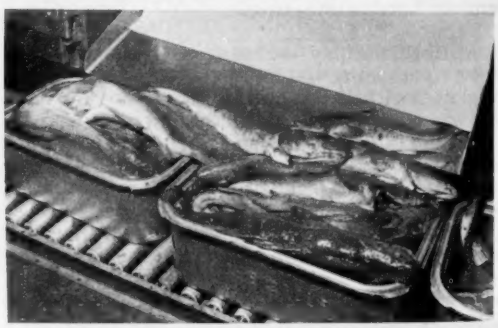

Fig. 4 - After four hours of treatment by carefully regulated temperature, humidity, and high-velocity air, the fish blocks emerge from the thawing unit as individual fish ready for filleting.

It is claimed that the new thawing unit preserves the molecular structure of fish tissue, prevents scale damage, and preserves natural color.

The new thawing plant belongs to one of Britain's largest fishery firms. In using the hot-air method of thawing, it contains refinements not previously found in equipment of this type. At the same time, it reverses a

United Kingdom (Contd.):

trend towards dielectric thawing already in use in the British fishing industry.

* * * * *

TRAWLER "STELLA LEONIS" WINS SILVER COD TROPHY FOR 1963:

The 1963 winner of the Silver Cod Trophy in Great Britain was the 190-foot trawler Stella Leonis which landed 39,556 kits (553,784 pounds) of fish valued at £161,500 (US$452,200) in 1963. The vessel made 17 distant-water trips and was at sea for 335 days in 1963. The skipper of the Stella Leonis is only 33 years old, although he has 17 years of trawling experience.

The Silver Cod Trophy is presented annually to the British distant-water vessel with the largest catch for the year. In 1962, the winner of the trophy was the Somerset Maugham with landings of 46,560 kits (6,518,400 pounds) valued at £146,182 (US$409,130). The record for the competition, which started 10 years ago, is held by the Kirkella, which landed 46,589 kits or 6,522,460 pounds.

Note: See Commercial Fisheries Review, April 1963 p. 78.

Silver Cod Trophy winner in 1963. The Stella Leonis is fitted for starboard fishing only. Accommodations are provided amidships and aft for 30 persons. The fish-storage hold has a capacity of 18,170 cubic feet. The vessel is powered by a 1,800-horsepower Diesel engine.

SALT WATER CONVERSION BY MARINE WILDLIFE

How do sea mammals, sea birds, turtles, and marine iguanas which live on rocky ocean islands completely lacking in fresh water manage to thrive without this basic necessity? Many of the animals have special salt glands, which secrete a saline solution five times more concentrated than blood and twice as salty as sea water. Thus sea water is used and the excess salt eliminated via those glands. (Sea Secrets, April 1963.)

Editorial Assistants: Ruth V. Keefe and Jean Zalevsky

Compositors: Alma Greene and Marjorie McGlone

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P. 36--FAO photo; p. 100--Coast and Geodetic Survey.

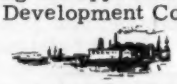
FEDERAL ACTIONS

Department of Commerce

SMALL BUSINESS ADMINISTRATION

ALASKA FIRM TO RECEIVE LOAN FUNDS FROM SBA INSTEAD OF ARA:

The Small Business Administration (SBA) approved a loan of $155,000 to the Aleutian Development Company on November 20, 1963. The Area Redevelopment Administration (ARA) had previously, on June 13, 1963, approved an industrial loan of $148,367 to the company to be used to replace and modernize its canning plant equipment and to permit expansion of salmon and crab canning operations at Jamal, Alaska. The ARA loan, however, was cancelled on December 27, 1963, following the approval of the loan to the Aleutian Development Company.



Department of the Interior

FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

NEW FEES FOR FISHERY PRODUCTS INSPECTION SERVICES:

New fees and charges for fishery products inspection services of the U. S. Department of the Interior became effective on February 15, 1964. The basic change was the increase in regular hourly rates for continuous inspection from $4.45 to $5.55 and for lot inspection from $6.50 to $7.80. The cost of maintaining the inspection service for processed fishery products and other products has increased since the adjustment of fees which became effective February 1, 1963.

The amendment as it appeared in the Federal Register of February 7, 1964, follows:

Title 50—WILDLIFE AND FISHERIES

Chapter II—Bureau of Commercial Fisheries, Fish and Wildlife Service, Department of the Interior

SUBCHAPTER G—PROCESSED FISHERY PRODUCTS, PROCESSED PRODUCTS THEREOF, AND CERTAIN OTHER PROCESSED FOOD PRODUCTS

PART 260—INSPECTION AND CERTIFICATION

Changes in Fees and Charges

The regulations governing Part 260—Inspection and Certification of Subchapter G—Processed Fishery Products, Processed Products Thereof, and Certain Other Processed Food Products, relating to fees and charges (50 CFR 260.70 to 260.81) are hereby amended pursuant to the authority contained in section 6(a) of the Fish and Wildlife Act of 1956 (16 U.S.C. 724e(a)), as amended. The amendment as hereinafter set forth revises the schedule of fees and charges for inspection services.

As a result of the Federal pay increase effective January 1, 1964, and increased operating expenses, the cost of maintaining the inspection service for processed fishery products and other products has increased since the adjustment of fees which became effective February 1, 1963. The basic change is the increase in the hourly rates for continuous inspection from $4.45 to $5.55 and for lot inspection and related inspection services from $6.50 to $7.80.

The amendment is as follows:

1. Section 260.70 is hereby revised to read as follows:

§ 260.70 Schedule of fees.

(a) Unless otherwise provided in a written agreement between the applicant and the Secretary, the fees to be charged and collected for any inspection service performed under the regulations in this part at the request of the United States, or any agency or instrumentality thereof, shall be in accordance with the applicable provisions of §§ 260.70 to 260.81.

(b) Unless otherwise provided in the regulations in this part, the fees to be charged and collected for any inspection service performed under the regulations in this part shall be based on the applicable rates specified in this section for the type of service performed.

(1) Continuous inspection:

	Per hour
Regular time	$5.55
Overtime	6.00

Applicants shall be charged at an hourly rate of $5.55 per hour for regular time and $6.00 per hour for overtime in excess of 40 hours per week for services performed by inspectors assigned to plants operating under continuous in-

spection. Applicants shall be billed monthly at a minimum charge of 8 hours per working day plus overtime, when appropriate, for each inspector. A minimum yearly charge of 260 days will be made for each inspector permanently assigned to each plant.

(2) Lot inspection, officially and unofficially drawn samples.

For lot inspection services performed between the hours of 7 a.m. and 5 p.m. of any regular workday—$7.80 per hour.

For lot inspection services performed between the hours of 5 p.m. and 7 a.m. of any regular workday—$10.00 per hour.

For lot inspection services performed on Saturday, Sunday, and National legal holidays—$10.00 per hour.

The minimum fee to be charged and collected for inspection of any lot of product shall be $4.00.

(c) Fees to be charged and collected for lot inspection services furnished on an hourly basis shall be based on the actual time required to render such service including, but not limited to, the travel, sampling, and waiting time required of the inspector, or inspectors, in connection therewith, at the rate of $7.80 per hour for each inspector, except as provided in paragraph (b)(2) of this section.

2. Section 260.71(c) is hereby revised to read as follows:

§ 260.71 Inspection services performed on a resident basis.

(c) A charge of $7.80 per hour plus actual costs to the Bureau of Commercial Fisheries for per diem and travel costs incurred in rendering service not specifically covered in this section; such as, but not limited to, initial plant surveys.

3. Section 260.76 is hereby revised to read as follows:

§ 260.76 Charges based on hourly rate not otherwise provided for in this part.

When the appropriate Regional or Area Director determines that any inspection or related service rendered is such that charges based upon the foregoing sections are clearly inapplicable, charges may be based on the time consumed by the inspector in performance of such inspection service at the rate of $7.80 per hour.

Notice of proposed rule making, public procedure thereon, and the postponement of the effective date of this revision later than February 15, 1964 (5 U.S.C. 1003), are impracticable, unnecessary and contrary to the public interest in that: (1) the Agricultural Marketing Act of 1946, as amended, provides that the fees charged shall, as nearly as possible, cover the cost of the service rendered; (2) the increases set forth herein are necessary to more nearly cover such cost, including but not limited to, increased salaries to Federal employees required by recent legislation; (3) it is imperative that the increase in fees become effective in time to meet such increased costs; (4) users of the inspection service were notified that the rates of fees to be charged for inspection service would be reevaluated as to need for readjustment with each Federal pay act increase by inclusion of § 260.81 into Part 260 Inspection and Certification and published in the FEDERAL REGISTER (27 F.R. 4781); and (5) additional time is not required by users of the inspection service to comply with this revision.

(Sec. 205, 60 Stat. 1090, as amended; 7 U.S.C. 1622 and 1624)

Dated: February 4, 1964, to become effective at 12:01 a.m., February 15, 1964.

STEWART L. UDALL,
Secretary of the Interior.

FEBRUARY 4, 1964.

* * * * *

NEWLY APPOINTED FISHERY ATTACHES ARRIVE AT POSTS:

Two fishery attaches, appointed by the U. S. Department of State in 1963, arrived in December at their respective posts, one in Latin America and the other in Africa. Richard S. Croker is now at the United States Embassy in Mexico City, Mexico, and will report on significant activities and developments in the Latin American region. George B. Gross, appointed to the post in Abidjan, Ivory Coast, will have regional responsibilities for fishery reporting on the countries along the western coast of Africa.

Department of Labor

WAGE AND HOUR AND PUBLIC CONTRACTS DIVISIONS

SHELLFISH-PROCESSING INDUSTRY TO BE SURVEYED AGAIN:

The shellfish-processing industry on the Atlantic and Gulf Coasts is to be surveyed again by the Wage and Hour and Public Contracts Division, U. S. Department of Labor, in order to determine the degree of compliance with the regulations of the Minimum Wage-Hour Law. The second survey is in connection with the expiration of the Handicapped Exemption Certificates as of April 1, 1964. After that date, only persons qualifying by the regular standards of being handicapped will be exempted.

Because of the many problems created by the application of the Minimum Wage-Hour Law to persons shucking oysters in the Middle and South Atlantic States, the Wage and Hour and Public Contracts Division made a study in 1962 of the shellfish-processing industry. A survey conducted by the Department of Labor at that time included all plants processing clams, crabs, oysters, and shrimp on the Atlantic and Gulf Coasts during June 1962. The results of the study were published in December 1962 in the report "Shellfish Processing on the Atlantic and Gulf Coast."

Department of the Treasury

BUREAU OF CUSTOMS

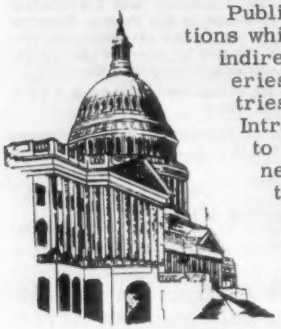
IMPORTS OF CANNED "TUNA WITH VEGETABLES" DUTIABLE AT 20 PERCENT AD VALOREM:

Canned tuna with vegetables--a product consisting of 43 percent tuna, 23 percent vegetables, and 34 percent highly seasoned sauce, with added rice bran oil--has been classified by the U. S. Bureau of Customs under the provision for "Edible preparations, not specially provided for . . . : Other" (dutiable at 20 per-

cent advalorem), item 182.91, Tariff Schedules of the United States. The decision was contained in a Bureau of Customs letter dated November 26, 1963. (Treasury Decisions, vol. 98, no. 50, December 12, 1963.)

Eighty-Eighth Congress

(Second Session)



Public bills and resolutions which may directly or indirectly affect the fisheries and allied industries are reported upon. Introduction, referral to committees, pertinent legislative actions by the House and Senate, as well as signature into law or other final disposition are covered.

THE BUDGET OF THE UNITED STATES: H. Doc. 265, Part I, The Budget of The United States Government Fiscal Year Ending June 30, 1965 (House of Representatives, 88th Congress, 2nd Session), 475 pp., printed. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, paper cover price $1.50.) The budget as submitted Jan. 21, 1964, to the Congress, provides under funds for the Department of the Interior increases for the Fish and Wildlife Service. For the Office of the Commissioner $393,000 as compared with $386,000 in 1964. Estimates for the Bureau of Commercial Fisheries total $26,445,000, an increase of $2,467,766 over the amount for 1964: Management and Investigations of Resources $20,681,000, an increase of $2,856,766 over 1964 appropriations and includes $1.8 million for expansion of oceanographic research; $720,000 for botulism and pesticides studies; the Federal-State Columbia River Fishery Development Program, designed to offset losses to salmon and steelhead runs resulting from Federal projects in the Columbia River Basin, will be continued with $588,000 requested for construction and $2,260,000 for operation and maintenance of facilities; Construction of Fishery Facilities is $4,200,000, which includes $1,000,000 for a shellfish research center at Milford, Conn., and $1,500,000 for a biological research laboratory for the tropical Atlantic area. Estimates for the Bureau of Sport Fisheries and Wildlife total $47,396,000, a net increase of $233,733 over 1964: Management and Investigations of Resources $34,419,000, an increase of $3,859,273; Construction $3,593,000, a decrease of $1,650,000.

COMMODITY PACKAGING AND LABELING: Packaging and Labeling Legislation (Hearings before the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary, United States Senate, 88th Congress, 1st Session), 979 pp., printed. Contains hearings held on S. 387, to amend the Clayton Act to prohibit restraints of trade carried into effect through the use of unfair and deceptive methods of packaging or labeling certain consumer commodities distributed in commerce, and for other purposes; Federal laws and regulations, State laws and regulations, wartime regulation of containers; and selected foreign jurisdictions.

H.R. 9940 (Roosevelt) introduced in House Feb. 7, 1964; referred to the Committee on the Judiciary; similar to S. 387.

CONSERVATION OF MARINE FISHERIES RESOURCES: The House Committee on Merchant Marine and Fisheries held hearings on Feb. 19 and 20, 1964, on S. 1988, and related bills, to prohibit fishing in the territorial waters of the United States and in certain other areas by persons other than nationals or inhabitants of the United States.

H.R. 9957 (Rogers) introduced in House Feb. 8, 1964, and H.R. 10028 (Wilson) introduced in House Feb. 19, 1964; referred to the Committee on Merchant Marine and Fisheries; similar to S. 1988.

CONSUMER PROTECTION: The American Consumer, Message from the President of the United States (H. Doc. 220), 7 pp., printed, received in the House and Senate February 5, 1964. Contains a statement of the consumer's position, recent advances, recommended legislation, administrative improvements, and conclusions. The President mentioned among other items the need to extend and clarify the inspection authority of the Food, Drug, and Cosmetic Act to permit inspection of factories where food is produced; the need for clarification of the law concerning the registration of pesticides; and the need to eliminate misleading advertising and packaging.

CUBAN FISHING ACTIVITIES IN UNITED STATES TERRITORIAL WATERS: Representative Rogers (Florida) on Feb. 3, 1964, addressed the House on the activities of the Cuban fishing fleet in United States territorial waters off Florida.

Representative Pelly (Washington) on Feb. 4, 1964, presented a statement to the House in support of the Senate-passed bill S. 1988 (to prohibit fishing in the territorial waters of the United States and in certain other areas by persons other than nationals or inhabitants of the United States), which would prohibit the Cuban fishing fleet (or any other foreign fishing fleet) from entering United States territorial waters.

FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT: The House on Feb. 3, 1964, received the report (H. Rept. 1125) on H.R. 9739. The House on on Feb. 17, 1964, passed S. 1605, amended (in lieu of H.R. 9739), to amend the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, to provide for labeling of economic poisons with registration numbers, to eliminate registration under protest, and for other purposes.

FISHERMEN'S FINANCIAL AID FOR ECONOMIC DISLOCATION: H.R. 9784 (Bennet) introduced in the House Jan. 28, 1964, to authorize the Secretary of the Interior to make payments to reestablish the purchasing power of American fishermen suffering temporary economic dislocation; referred to the Committee on Merchant Marine and Fisheries.

FISHERY RESOURCES: A magazine article titled "John F. Kennedy--Forthright for Fisheries" was inserted by Senator Magnuson in the Congressional Record, Appendix page A699, Feb. 17, 1964.

FOOD-FOR-PEACE, AND FISH: The Senate and House on Jan. 31, 1964, received a message from the President transmitting his legislative recommendations concerning agriculture (H.Doc.210). Among the items mentioned were Titles I and II of Public Law 480 concerning the food-for-peace program. The President recommended an extension of those two titles for five years. At the present time those titles would expire on December 31, 1964.

On Jan. 28,1964, Senator Bartlett (Alaska) inserted in the Congressional Record, pages 1208-1209, an article which appeared in the Wall Street Journal concerning fish in the food-for-peace program.

Senator Bartlett inserted in the Congressional Record, page 2818, Feb. 17, 1964, a speech delivered at the annual convention of the National Canners Association by the Director of the food-for-peace program describing the effect of the program and discussing the recent addition of certain fishery commodities to the program under Public Law 88-205.

MAINE FISHING INDUSTRY: On Jan. 31, 1964, Representative Tupper (Maine) inserted in the Congressional Record (Appendix, page A397) an editorial titled "Maine Fishing Industry Cannot Take Tariff Slash and Survive," from the Portland (Maine) Press Herald.

NORTH PACIFIC FUR SEALS CONVENTION: The Senate on Dec. 3, 1963, received a message from the President of the United States transmitting a protocol amending the interim convention on conservation of North Pacific fur seals, signed at Washington on Feb. 9, 1957, which protocol was signed at Washington on Oct. 8, 1963, on behalf of the Governments of Canada, Japan, the Union of the Soviet Socialist Republics and the United States of America (Ex. O, 88th Congress, 1st Session); referred to Committee on Foreign Relations.

The Senate Committee on Foreign Relations on Jan. 21, 1964, approved Protocol amending the interim convention on conservation of North Pacific fur seals. The Committee on Jan. 27, 1964, favorably reported (Ex. Rept. 1) Ex. O.

The Senate on Jan. 30, 1964, ratified Ex. O, Protocol amending the interim convention on conservation of North Pacific fur seals. No House action required.

OCEANOGRAPHY: Thirteenth Annual Report of the National Science Foundation, Message from the President of the United States (H. Doc. 209), 374 pp., printed, received in the House January 29, 1964. Contains a description of the program activities of the National Science Foundation including support of scientific research, institutional grants, education in the sciences, dissemination of scientific information, and studies of science resources. The Report includes a description of the Foundation's oceanographic programs which cover: (1) assistance for some of the most urgently required additions to the Nation's facilities for basic oceanographic research (this included 15 grants in 1963 totaling $5.9 million for the construction or conversion of ships and the construction or expansion of shore facilities), and (2) coordination of the United States program in the International Indian Ocean Expedition.

A statement by the Governor of California on oceanographic needs was inserted by Representative Hanna in the Congressional Record (Appendix pages 588-589), Feb. 7, 1964.

The article, "On the Shore of Narragansett Bay: a Great New Sea Laboratory," by the Dean of the Graduate School of Oceanography, University of Rhode Island, was inserted by Representative Fogarty in the Congressional Record (Appendix Pages A692-693), Feb. 13, 1964. The article describes the marine research facilities in the vicinity of Narragansett Bay and their relation to the New England fishing industry.

PRICE-QUALITY STABILIZATION: On Feb. 19, 1964, the Subcommittee on Quality Stabilization of the Senate Committee on Commerce concluded its hearings on S. 774, to amend the Federal Trade Commission Act, to promote quality and price stabilization, to define and restrain certain unfair methods of distribution and to confirm, define, and equalize the rights of producers and resellers in the distribution of goods identified by distinguishing brands, names, or trademarks, and for other purposes.

SCIENCE AND TECHNOLOGY OFFICE FOR CONGRESS: Establishment of a Congressional Science Advisory Staff (Hearing before the Subcommittee on Accounts of the Committee on House Administration, House of Representatives, 88th Congress, 1st Session), 88 pp., printed. Contains hearing held Dec. 4, 1963, on H.R. 6866 and H.R. 8066, to increase the effectiveness of the Congress in carrying out its functions by establishing a science advisory staff in the Senate and House of Representatives; includes testimony given by Members of Congress, officials of the Government, and members of various schools, associations, and in industry.

SMALL BUSINESS DISASTER LOANS: The House on Jan. 20, 1964, suspended the rules and passed, with amendments, S. 1309, to amend the Small Business Act by broadening the disaster loan authority and imposing criminal penalties for certain offenses. The bill, as amended by the House, contains three parts. (The bill as passed by the Senate contained four parts; the first part which would have involved an increased appropriation for the Small Business Administration revolving fund was deleted by a committee amendment in the House). The second part of the bill broadens the authority of the Small Business Act to make disaster loans to small business. At the present time this authority applies only to small businesses which have suffered economic injury because of draught or excessive rainfall. This would extend the authority to business injured by other natural disasters. The third part of the bill would extend the disaster loan authority to cases where economic injury was suffered by small businesses because of: "The inability * * * to process or market a product for human consumption because of disease or toxicity occurring in such product through natural or undetermined causes." The last part of the bill provides the Government with authority to bring criminal proceedings against anyone who steals property mortgaged or pledged to the Small Business Act for a loan.

The Senate on Jan. 27, 1964, concurred in the House amendments to S. 1309. The President on Feb. 5, 1964, signed S. 1309 into Public Law 88-264.

SOVIET FISHING INDUSTRY: The Postwar Expansion of Russia's Fishing Industry (Prepared at the Request of Hon. Warren G. Magnuson, Chairman, for the use of the Committee on Commerce, United States Senate by the Legislative Reference Service, the Library of Congress with Translations of fishery articles and news from Soviet publications by the Fisheries Research Institute, University of Washington), 59 pp., printed. Contains: (1) the growth of the Soviet annual fish catch; (2) the drive to the open sea; (3) expansion of the Soviet fishing fleet; (4) Soviet fishing tactics on the high seas; (5) the extracurricular activities of the fishing fleet; (6) fishery research and manpower training; (7) the economic status of the fishing industry; (8) the fisheries of Eastern Europe; (9) the outlook; a summary; and appendixes.

Representative Keith of Massachusetts on Jan. 31, 1964, inserted in the Congressional Record (Appendix, pages A409-A410) an article from the New Bedford (Mass.) Times titled "Red Fishing Threat."

CONSERVATION OF MARINE FISHERIES RESOURCES A newspaper article on Soviet fishing activities on the high seas was inserted by Senator Magnuson in the Congressional Record, page 2800, Feb. 17, 1964.

TRANSPORTATION AMENDMENTS OF 1964: H.R. 9903 (Harris) introduced in House Feb. 5, 1964 (following hearings by the House Committee on Interstate and Foreign Commerce on some of the proposals originally contained in H.R. 4700 and H.R. 4701), to amend the Interstate Commerce Act and Federal Aviation Act of 1958 so as to strengthen and improve the national transportation system, and to implement more fully the national transportation policy, and for other purposes; referred to the Committee on Interstate and Foreign Commerce which favorably reported the bill to the House on February 6, 1964. The bill includes provisions which would extend to railroads and domestic water carriers the exemption now applicable to the transportation of agricultural commodities and fishery products by motor carriers. However, all carriers (of whatever mode) would be required to file with the Interstate Commerce Commission (ICC) their exempt rates on agricultural and fishery products, except those moving in trucks having three axles or less. The anti-trust laws would also be made applicable to the shipment of the exempt commodities.

The bill also contains provisions which among other things would: (a) permit shippers to recover damages from motor carriers and freight forwarders for unreasonable rates charged in the past (a right now limited to rail and water shipments); (b) permit persons injured by illegal operations to sue in Federal courts for injunctions, and permit the ICC to join shippers in enforcement proceedings; and (c) increase fines for certain violations of the Interstate Commerce Act to a maximum of $500 for each offense and $250 for each additional day of violation.

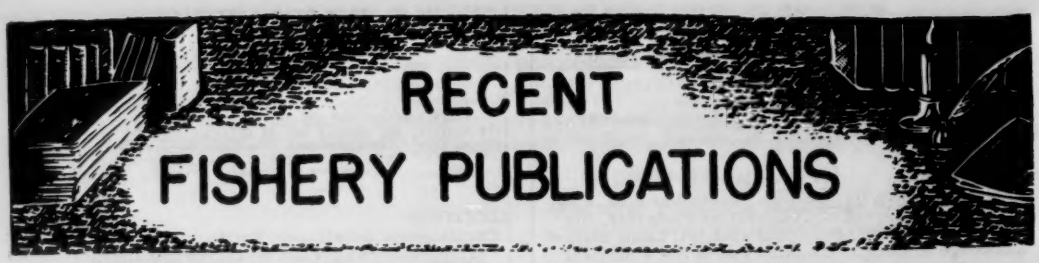
The bill would also amend section 1003 of the Federal Aviation Act of 1958 (49 U.S.C. 1483) which now provides for joint rates between air and other common carriers, and in the case of joint rates between air carriers and carriers subject to the Interstate Commerce Commission, for a joint board comprising representatives of both agencies to pass upon such joint rates in accordance with standards of the Federal Aviation Act. The bill would create a new joint board comprising representatives of the Civil Aeronautics Board, the Federal Maritime Commission, and the Interstate Commerce Commission to handle through service and joint rates between places in the United States and its possessions of any combination of air, water, and ground carriers where such rates are not subject to the individual regulatory jurisdiction of any one of those agencies.

Under this section, the Alaska Railroad would be authorized to establish through routes and joint rates with other carriers which would be under the jurisdiction of the joint board.

VESSEL CONSTRUCTION SUBSIDY AMENDMENTS: H.R. 9815 (Tupper) introduced in House Jan. 31, 1964, to amend the act of June 12, 1960, relating to the construction of fishing vessels to extend it for an additional period; referred to Committee on Merchant Marine and Fisheries.

Unlike S. 1006 and companion House bills on this subject pending before the Merchant Marine and Fisheries Committee, H.R. 9815 would merely extend the expired subsidy program (P. L. 86-516) for a total of 7 years (including the 3 years that the Program was in effect and the time that has elapsed since the Program expired) without increasing the amount of subsidy or deleting the restrictions in the old law. As under the old Program, H.R. 9815 would permit maximum subsidies of 33-1/3 percent and would limit the construction of subsidized vessels to fisheries injured by foreign imports. S. 1006 and the other bills pending before the House Committee would provide for subsidies of up to 55 percent and would eliminate restrictions regarding injury to a fishery from imports.

WATER POLLUTION CONTROL ADMINISTRATION: The House Committee on Public Works on Feb. 17-19, 1964, held and concluded hearings on H.R. 3166, 9963, 4571, S. 649, and H.R. 6844, and related bills, to amend the Federal Water Pollution Control Act, as amended. Testimony was given by public witnesses.



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CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES.
MNL - REPRINTS OF REPORTS ON FOREIGN FISHERIES.
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number Title

CFS-3340 - Frozen Fishery Products, October 1963, 8 pp.
CFS-3344 - Texas Landings, June 1963, 3 pp.
CFS-3345 - Texas Landings, July 1963, 3 pp.
CFS-3346 - Texas Landings, August 1963, 3 pp.
CFS-3352 - Gulf Coast Shrimp Data, July 1963, 22 pp.
CFS-3357 - New York Landings, September 1963, 4 pp.
CFS-3358 - Gulf Coast Shrimp Data, 1962 Annual Summary, 38 pp.
CFS-3360 - Massachusetts Landings, May 1963, 8 pp.
CFS-3361 - North Carolina Landings, October 1963, 4 pp.
CFS-3362 - California Landings, August 1963, 4 pp.
CFS-3363 - Alabama Landings, September 1963, 4 pp.
CFS-3365 - Georgia Landings, October 1963, 3 pp.
CFS-3366 - South Carolina Landings, October 1963, 3 pp.
CFS-3367 - Maine Landings, September 1963, 4 pp.
CFS-3368 - Rhode Island Landings, September 1963, 4 pp.
CFS-3371 - Florida Landings, October 1963, 8 pp.
CFS-3372 - Louisiana Landings, September 1963, 3 pp.
CFS-3373 - Gulf Fisheries, 1962 Annual Summary, 13 pp.
CFS-3374 - Mississippi Landings, September 1963, 3 pp.
CFS-3375 - New York Landings, October 1963, 4 pp.
CFS-3376 - Fish Meal and Oil, October 1963, 2 pp.
CFS-3377 - New Jersey Landings, September 1963, 4 pp.
CFS-3378 - Wisconsin Landings, October 1963, 2 pp.
CFS-3379 - Louisiana Landings, October 1963, 3 pp.
CFS-3380 - North Carolina Landings, November 1963 4 pp.
CFS-3382 - Shrimp Landings, August 1963, 8 pp.
CFS-3389 - Maine Landings, October 1963, 4 pp.
CFS-3390 - Alabama Landings, October 1963, 4 pp.

Sep. No. 700 - Utilization of U. S. Otter-Trawl Shrimp Vessels in the Gulf of Mexico, 1959-1961.

Report to the Bureau of Commercial Fisheries on the Branch of Economics, by James Crutchfield and others, Circular 173, 15 pp., April 1963. The primary purpose of the Committee which prepared this report was to establish the appropriate structure and scale of economic effort in the operation of the Bureau of Commercial Fisheries. The report deals with relation of economic analysis to the operation of the Bureau; type of economic program that the Bureau should undertake; type of organization required to implement this program; and type of personnel required. An appendix covers statistical data requirements.

Report of the Bureau of Commercial Fisheries for the Calendar Year 1961, 86 pp., illus., printed 1963. During the calendar year 1961, the Bureau of Commercial Fisheries continued its efforts to provide the research and services that will assist the Nation to utilize fully and wisely its fishery resources. These efforts cover a wide spectrum of activities, from basic research in such fields as fishery biology or fish oil technology to such practical applications as demonstrations of fish cookery in schools or the dissemination of news of the daily prices for fish landed in principal United States ports. The report touches briefly on phases of biological, economic, engineering, oceanographic, and technological research. It also discusses the many Bureau service programs, such as those involved in fishery products inspection, fishery market promotion, market news reporting, statistics collection, vessel loans, vessel safety promotion, and others.

THE FOLLOWING MARKET NEWS LEAFLET IS AVAILABLE FROM THE FISHERY MARKET NEWS SERVICE, U. S. BUREAU OF COMMERCIAL FISHERIES, SUITE 611, WYATT BLDG., 777 14TH ST. NW., WASHINGTON, D. C. 20005.

Number Title

MNL - 23 - Fisheries of Chile, Part I--North Chile, 1960-1963, 52 pp.

THE FOLLOWING ENGLISH TRANSLATION OF A FOREIGN LANGUAGE ARTICLE IS AVAILABLE ONLY FROM THE U. S. BUREAU OF COMMERCIAL FISHERIES BIOLOGICAL LABORATORY, BOX 3830, HONOLULU, HAWAII, 96812.

Biochemical Studies on Fish Blood. V--On the Respiration Elements of Fish Blood, by Kaname Sato, illus., processed, limited distribution, October 1963. (Translated from the Japanese, Memoirs of the Kagoshima University Faculty of Fisheries, vol. 3, no. 1, September 1953, pp. 132-140.)

THE FOLLOWING ENGLISH TRANSLATION OF A FOREIGN LANGUAGE PUBLICATION IS AVAILABLE ONLY FROM THE U. S. BUREAU OF COMMERCIAL FISHERIES BIOLOGICAL LABORATORY, 2725 MONTLAKE BLVD., SEATTLE, WASH., 98102.

Bio-Statistical Material on Salmon Collected by the Soviet Section in 1960, 84 pp., processed. (Trans-

lated from the Russian, Sovetsko-Iaponskaia Komissiia po Rybolovstvu v Severo-Zapadnoi Chasti Tikhogo Okeana (SIARK), Piataia Sessiia, Tokyo, 86 pp.)

THE FOLLOWING PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

California Fishery Market News Monthly Summary, Part II - Fishing Information, December 1963, 8 pp., illus. (U. S. Bureau of Commercial Fisheries, Biological Laboratory, P. O. Box 6317, Pt. Loma Station, San Diego 6, Calif.) Contains sea surface temperatures, fishing and research information of interest to the West Coast tuna-fishing industry and marine scientists; for the month indicated.

(Chicago) Monthly Summary of Chicago's Wholesale Market Fresh and Frozen Fishery Products Receipts, Prices, and Trends, November 1963, 14 pp. (Market News Service, U.S. Fish and Wildlife Service, U.S. Customs House, 610 S. Canal St., Rm. 1014, Chicago, Ill. 60607). Receipts at Chicago by species and by states and provinces for fresh- and salt-water fish and shellfish; and weekly wholesale prices for fresh and frozen fishery products; for the month indicated.

Gulf of Mexico Monthly Landings, Production and Shipments of Fishery Products, November 1963, 8 pp. (Market News Service, U.S. Fish and Wildlife Service, Rm. 609, 600 South St., New Orleans, La. 70130). Gulf States shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; wholesale prices of fish and shellfish on the New Orleans French Market; fishery imports at Port Isabel and Brownsville, Texas, from Mexico; Gulf menhaden landings and production of meal, solubles, and oil; and sponge sales; for the month indicated.

Monthly Summary of Fishery Products Production in Selected Areas of Virginia, North Carolina, and Maryland, December 1963, 4 pp. (Market News Service, U.S. Fish and Wildlife Service, 18 S. King St., Hampton, Va., 23369.) Landings of food fish and shellfish and production of crab meat and shucked oysters for the Virginia areas of Hampton Roads, Chincoteague, Lower Northern Neck, and Lower Eastern Shore; the Maryland areas of Crisfield, Cambridge, and Ocean City; and the North Carolina areas of Atlantic, Beaufort, and Morehead City; together with cumulative and comparative data on fishery products and shrimp production; for the month indicated.

(Seattle) Washington and Alaska Receipts and Landings of Fishery Products for Selected Areas and Fisheries, Monthly Summary, December 1963, 7 pp. (Market News Service, U.S. Fish and Wildlife Service, 706 Federal Office Bldg., 909 First Ave., Seattle, Wash., 98104.) Includes Seattle's landings by the halibut and salmon fleets reported through the exchanges; landing of halibut reported by the International Pacific Halibut Commission; landings of otter-trawl vessels as reported by the Fishermen's Marketing Association of Washington; local landings by independent vessels; coastwise shipments from Alaska by scheduled and non-scheduled shipping lines and airways; imports from British Columbia via rail, motor truck, shipping lines, and ex-vessel landings; Washington shrimp landings; and imports from other countries through Washington customs district; for the month indicated.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATIONS OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

ADDITIVES:

Carcinogenic Substances, Particularly 3,4-Benzpyrene, in Smoked Products and Measures to Eliminate Them, by L. M. Shabad, Working Paper No. 12, 12 pp., printed. (Translated from the Russian, Evaluation of the Carcinogenic Hazards of Food Additives, 1960). Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.

ALGAE:

"Algenprodukte in der Pharmazie" (Algal Products in Pharmacy), by H. von Czetsch Lindenwald, article, Botanica Marina, vol. 3, no. 1, 1961, pp. 22-29, printin German with English, French, and Spanish summaries. Studiengesellschaft zur Erforschung von Meeresalgen, e. V. Hamburg, Germany.

"The Blue-Green Algae," by M. V. Gusev, article, Microbiology, vol. 30, May-June 1962, pp. 897-911, printed. American Institute of Biological Sciences, 2000 P. St. NW., Washington 6, D. C.

"Chemical Composition of Some Philippine Algae," by Antonio I. de Leon, Natividad Eufemio, and Maxima Pineda, article, The Philippine Journal of Science, vol. 92, no. 1, March 1963, pp. 77-87, printed, single copy $2. National Institute of Science and Technology, P. O. Box 774, Manila, Philippines.

"Cytochromes of a Blue-Green Alga: Extraction of a c-Type with a Strongly Negative Redox Potential," by Raymond W. Holton and Jack Myers, article, Science, vol. 142, no. 3589, October 11, 1963, pp. 234-235, printed, single copy 35 cents. American Society for the Advancement of Science, 1515 Massachusetts Ave. NW., Washington 5, D. C.

"First All-Union Conference on the Cultivation of Unicellular Algae," by L. K. Osnitskaya and S. V. Goryunova, article, Microbiology, vol. 30, May-June 1962, pp. 918-921, printed. American Institue of Biological Sciences, 2000 P. St. NW., Washington 6, D. C.

"Protein Fat, Carbohydrate, and Ash Content of Some Mass Black Sea Planktonic Algae Grown in Cultures, U.S.S.R., by L. A. Lanskaya and T. I. Pshenina, OTS 63-31615, 17 pp., printed, 50 cents, August 26, 1963. Office of Technical Services, U.S. Department of Commerce, Washington, D. C., 20235.

ANCHOVY:

"Un Analisis del Numero de Vertebras de la Anchoveta Peruana (Engraulis ringens J.)" (An Analysis of the Number of Vertebrae of the Peruvian Anchovy, Engraulis ringens J.), by R. Jordan, article, Boletin, vol. I, no. 2, 1963, pp. 25-43, illus., printed in Spanish with English summary. Library, Instituto de Investigation de los Recursos Marinos, P. O. Box 3734, Lima, Peru.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

"Descripcion de Huevos y Larvas de Anchoveta Peruana (Engraulis ringens J.)" (Description of Eggs and Larvae of the Peruvian Anchovy, Engraulis ringens J.), by H. Einarsson and B. Rojas de Mendiola, article, Boletin, vol. 1, no. 1, 1963, pp. 1-23, illus., printed in Spanish with English prologue and summary. Library, Instituto de Investigacion de los Recursos Marinos, P.O. Box 3734, Lima, Peru.

La Pesca de la Anchoveta--Estadistica de Pesca y Esfuerzo en los Meses de Julio-Diciembre de 1962 y Resumen de los Resultados de la Pesca Total durante el Ano 1962 (The Anchovy Fishery--Statistics of the Fishery and Fishing Effort in the Months of July-December 1962 and Summary of the Entire Fishery during the Year 1962), by W. F. Doucet, G. Saetersdal, and I. Vasquez A., Report No. 15, 26 pp., illus., processed in Spanish, 1963. Library, Instituto de Investigacion de los Recursos Marinos, P. O. Box 3734, Lima, Peru.

ANTIBIOTICS:
"Observations on the Action of Tetracyclines on the Preservation of Adriatic Codfish. I--Plan of Investigation and Experimental Methods," by Guglielmo Ciani and others, article, Chemical Abstracts, vol. 57, October 29, 1962, 11613f, printed. American Chemical Society, 1155 16th St. NW., Washington 6, D. C.

"Studies on Food Preservatives. V--Antagonism between CTC-Resistant and CTC-Sensitive Bacteria," by Tomoaki Okitsu and Toshiharu Kawabata, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 28, August 1962, pp. 837-840, printed. Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku, Tokyo, Japan.

BACTERIOLOGY:
Investigations of the Abundance of Saprophytic Bacteria in Lake Dalnee, by E. M. Krokhin, Translation Series No. 419, 5 pp., processed, 1962. (Translated from the Russian, Mikrobiologiia, vol. 23, no. 1, 1954, pp. 49-52.) Fisheries Research Board of Canada, Biological Station, Nanaimo, B. C., Canada.

BIOCHEMISTRY:
"A New Technique for the Isolation of Flavor Components from Fats and Oils," by S.S. Change, article, Journal of the American Oil Chemists' Society, vol. 38, 1961, pp. 669-671, illus., printed. American Oil Chemists' Society, 35 E. Wacker Dr., Chicago 1, Ill.

Properdin Content of Fish U.S.S.R., by V. I. Luk'yanenko and G. A. Mikheyeva, OTS 63-31659, 7 pp., 50 cents, August 30, 1963. Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20235.

"Studies on Muscle of Aquatic Animals. XXXI--Extractability of Fish Myosin (Part 2) Salting-Out Analysis of Short-Time Extract of Fish Myosin," by Tadao Ueda, Shimizu Yutaka, and Wataru Simidu, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 28, October 1962, pp. 1,005-1,009, printed Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku, Tokyo, Japan.

BORERS:
Marine Borers--An Annotated Bibliography, by William F. Clapp and Roman Kenk, 1136 pp., printed, $7, 1963. Office of Naval Research, U.S. Department of the Navy, Washington, D.C. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402.) A compilation of all essential published literature on marine borers up to 1954. Comprises about 3,540 items, each with a concise informative abstract. Two indexes are appended; one a geographic index of borer damage in the various areas of the world, the other a subject index leading to information on the morphology, distribution, life cycle, and physiology of the marine-boring animals and on the various methods of borer control and damage prevention.

BREAM:
On the Effect of Feeding Conditions and Abundance of Spawners on the Amount of Progeny Produced by Caspian Bream, by K. S. Zemskaia, Translation Series No. 438, 10 pp., illus., processed, 1963. (Translated from the Russian, Trudy Soveshchanii Iktiologicheskoi Komissii Akademii Nauk SSSR, no 13, 1961, pp. 307-313.) Fisheries Research Board of Canada, Biological Station, Nanaimo, B.C., Canada.

BROWNING:
Browning Reactions in Dried Fish Products, by N. R. Jones, Torry Memoir No. 107, 7 pp., printed, 1962. Torry Research Station, Aberdeen, Scotland.

BURBOT:
"The Biology and Taxonomy of the Burbot, Lota lota, in Heming Lake, Manitoba," by G.H. Lawler, article, Journal of the Fisheries Research Board of Canada, vol. 20, no. 2, 1963, pp. 417-433, printed. Queen's Printer & Controller of Stationery, Ottawa, Canada.

CALIFORNIA:
California Cooperative Oceanic Fisheries Investigations Reports, vol. IX, 1 July 1960 to 30 June 1962, 74 pp., illus., printed. Marine Research Committee, Department of Fish and Game, Sacramento, Calif. This report consists of two sections. The first contains a brief review of the administrative and research activities during the period July 1, 1960, to June 30, 1962, a description of the fisheries, and a list of publications arising from the program. The second section is comprised of original scientific contributions which are either the direct results of the research programs, or represent research directly pertinent to resource development in the pelagic realm off California.

CANADA:
Guide to Marine Life of British Columbia, by G. Clifford Carl, Handbook No. 21, illus., printed, 50 Canadian cents. British Columbia Provincial Museum, Department of Recreation and Conservation, Victoria, B.C., Canada. A simplified introductory guide to marine flora and fauna of British Columbia, designed particularly for fishermen and boat owners. Included are sections dealing with seaweeds, mammals, birds, fishes, jellyfish, starfish and related forms, crabs, barnacles, molluscs, sea worms, and wood borers.

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Journal of the Fisheries Research Board of Canada, vol. 20, no. 5, September 1963, 252 pp., illus., printed, single copy C$2. Queen's Printer, Ottawa, Canada. Includes, among others, articles on: "Glycolysis in Lingcod Muscle during Frozen Storage," by N. Tomlinson, R.E.E. Jonas, and S.E. Geiger; "Composition and Palatability of Porbeagle Flesh," by W.J. Dyer, D.I. Frazer, and S.N. Tibbo; "Vertebral Numbers of American Plaice, Hippoglossoides platessoides (Fabricius), in the Northwest Atlantic," by T. K. Pitt; "Brine Spray Frozen Tuna. Sodium, Potassium, Lactic Acid and Acid-Soluble Phosphorus in the Muscle, and the Influence Thereon of Thawing and Precooking," by N. Tomlinson and S. E. Geiger; "The Invasion of the Lower Great Lakes by the White Perch, Roccus americanus (Gmelin)," by W. B. Scott and W. J. Christie; "Vital Statistics of Esox masquinongy in Nogies Creek, Ontario. I--Tag Loss, Mortality Due to Tagging, and the Estimate of Exploitation," by Barry S. Muir; "Factors Influencing the Effectivness of Fresh Fish Washing Operations," by W. A. MacCallum, M. W. Mullan, and Isabel N. Plaunt; "Effect of Photo-Periods on the Reactions of Juvenile Atlantic Salmon (Salmo salar L.) to Light Stimuli," by A. T. Pinhorn and C. W. Andrews; and "Pollock (Pollachius virens (L.)) in the Bay of Fundy," by D. H. Steele.

CANNING:

"Change in the Content of Nitrogen-Containing Substances of Fish Prepared and Canned in Tomato Sauce," by M. V. Kalantarova, article, Chemical Abstracts, vol. 57, August 6, 1962, 3838a, printed. American Chemical Society, 1155 16th St. NW., Washington 6, D. C.

"Experiments on Canning Freshwater Fish. III," by A. W. Lantz, article, Progress Reports, Biological Station and Technological Unit, no. 2, 1961, pp. 37-47, illus., printed. Biological Station and Technological Unit, Fisheries Research Board of Canada, London, Ont., Canada.

"The Stability of Canned Foods in Long-Term Storage," by S. R. Cecil and J. G. Woodroof, article, Food Technology, vol. 17, May 1963, pp. 131-138, printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

CARP:

"Ob Izmenchivosti Sazana Cyprinus carpio haematopterus Tem. Et Schl. Basseina Ozera Dalainor (Knr)" (Variability of Cyprinus carpio Haematopterus in Basin of Lake Dalainor, People's Republic of China), by A. A. Svetovidova, article, Sbornik Trudov Zool. Muzeya. Moscow Univ., vol. 8, 1961, pp. 183-187, printed in Russian. Akademiia Nauk, Moscow, U.S.S.R.

CASPIAN SEA:

"Dinamika Chislennosti Ekspluatiruemykh Stad Vobly, Leshcha I Sudaka Severnogo Kaspiya" (Dynamics of the Quantity of Exploitable Shoals of Roach, Bream, and Pike-Perch), by V. N. Lukashov, article, Trudy Soveshchanii. Iktiol, Komissiya Akad. Nauk SSSR, vol. 13, 1961, pp. 445-453, printed. Four Continent Book Corp., 156 5th Ave., New York 10. N.Y.

CHAR:

The Food of Different Biological Forms of the Dolly Varden Char, SALVELINUS MALMA (Walb.) in Certain Kamchatka Waters, by K. A. Savvaitova and Ia. S. Reshetnikov, Translation Series No. 373, 12 pp., processed, 1962. (Translated from the Russian, Voprosy Ikhtiologii, vol 1, no. 1, 1961, pp. 127-135.) Fisheries Research Board of Canada, Biological Station, Nanaimo, B. C., Canada.

COD:

"Here's How They Take Black Cod Off The Coast of California," article, Fish Boat, vol. 8, May 1963, pp. 12-13, 15, printed. H. L. Peace Publications, 624 Gravier St., New Orleans 9, La.

The Possible Influence of the Nutrition of Young Cod on its Abundance, by I. Ya. Ponomarenko, 8 pp., processed, 1963. (Translated from the Russian, Trudy Soveshchanii, no. 13, 1961, pp. 301-306.) Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, Suffolk, England.

"Quality Changes in Stored Refrozen Cod Fillets," by by W. J. Dyer, article, Supplement to Bulletin de l' Institut International du Froid, 1962, pp. 1-10, printed International Institute of Refrigeration, 177 Blvd. Malesherbes, Paris 17, France.

"Respiration of the Atlantic Cod," by Richard L. Saunders, article, Journal of Fisheries Research Board of Canada, vol. 20, no. 2, 1963, pp. 373-386, printed. Queen's Printer & Controller of Stationery, Ottawa, Canada.

COLD CHAIN:

The Freezer Chain--Problems and Possibilities, by G. F. Lorentzen, 39 pp., illus., printed, March 1963. Institute of Refrigeration, New Bridge Street House, New Bridge St., London EC4, England

COMMISSIONS:

Fifteenth Annual Report of the Pacific Marine Fisheries Commission for the Year 1962, 38 pp. illus., printed, June 1963. Pacific Marine Fisheries Commission, 741 State Office Bldg., 1400 SW. Fifth Ave., Portland 1, Oreg. Reports briefly on the specific activities of the Pacific Marine Fisheries Commission during 1962 and presents a review of developments in the fields of research, regulation, and coordination in the States of Washington, Oregon, and California. Reviews activities during the first 15 years of the Commission's existence; legislation enabling entrance of Alaska and other states into the Compact; and Commission actions on Federal legislation, seismic exploration, pollution problems, salmon fishery, tuna fishery, groundfish and shellfish fisheries, and other topics. Presents sections on the status of albacore, crab, pink shrimp, troll salmon, and trawl fisheries of the Pacific Coast. Also includes results of investigations of Oregon-Washington chinook salmon tagging; salmon hooked mortality, treble and single hooks; ocean sport fisheries, groundfish tagging, and crab condition.

Gulf States Marine Fisheries Commission Fourteenth Annual Report 1962-1963 (to the Congress of the United States and to the Governor and Legislators of Alabama, Florida, Louisiana, Mississippi, and Texas), 45 pp., illus., printed. Gulf States Marine Fisheries Commission, 312 Audubon Bldg., New Orleans, La., 70112. Outlines the Commission's activities for the period October 1962-October 1963, with a summary

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of recommendations and actions. Describes briefly the activities of each of the member States during that period. Includes short discussions of U. S. Fish and Wildlife Service activities in shellfish, bottomfish, and pelagic fish exploration; offshore shrimp gear research; faunal assessment; shrimp burrowing behavior studies; experiments in electrical stimulation of pink shrimp; and a physiology and behavior of young shrimp program. Also discusses the estuarine ecology program, industrial fishery program, a fishery-oceanographic research vessel under construction, pesticides program, oyster program, clam studies, red tide program, voluntary standards of grade for fishery products, the Inspection Service, market development programs, and investigation of navigation projects. Also contains the financial report of the Commission for the year ended June 30, 1963.

CONTAINERS:
"Gyorsfagyasztott Elelmiszerek Szallitasara Szant Szigetelt Tartalyok Vizsgalata" (Insulated Transport Containers for Quick Frozen Foods), by E. Almasi, P. Perjes, and D. Molnar, article, Kozlemenyei Kosponti Elelmiszeripari Kutato Intezet, no. 1, 1962, pp. 11-18, illus., printed in Hungarian. Kozponti Elelmiszeripari Kutato Intezet Kozlemenyei, Kozponti Elelmiszeripari Kutato Intezet, Budapest, Hungary.

DECAPODS:
The Larval Development of PALAEMONETES PALUDOSUS (Gibbes, 1950) (Decapoda, Palaemonidae), Reared in the Laboratory, by Sheldon Dobkin, Contribution No. 441, 21 pp., illus., printed. (Reprinted from Crustaceana, vol. 6, part 1, 1963, pp. 41-61.) The Marine Laboratory, University of Miami, 1 Rickenbacker Causeway, Miami 49, Fla.

DENMARK:
Kobenhavns Universitets Ferskvandsbiologiske Laboratorium (Freshwater Biological Laboratory, University of Copenhagen), by Kaj Berg, 5 pp., illus., printed in Danish and in English, 1962. N. T. Kroyers Bogtrykkeri, Kgs., Lyngby, Denmark.

DIRECTORIES:
Fishing News Directory and Equipment Guide, 1964, by Arthur J. Heighway and Lloyd G. B. Butcher, 170 pp., illus., printed, £1 2s. 3d. (about US$3.10), December 1963. Arthur J. Heighway Publictions Ltd., Ludgate House, 110 Fleet St., London EC4, England. Contains lists of fishing vessels, owners and managers, individual fleets in main ports and their owners, and builders of fishing vessels; propulsion, transmission and steering equipment suppliers and manufacturers; electronics and radio equipment suppliers and manufacturers; chandlery and life-saving equipment suppliers and manufacturers; catching and hauling equipment suppliers and manufacturers; and marketing and processing equipment suppliers and manufacturers. It also includes lists of official authorities and organizations, and associations in the fishing industry; and an alphabetical index of all suppliers and manufacturers. A most comprehensive work of reference to the British fishing industry.

DOLPHIN:
The Dolphin in History, by Ashley Montagu and John C. Lilly, 55 pp., illus., printed, $2, 1963. William Andrews Clark Memorial Library, University of California at Los Angeles, Los Angeles, Calif. Two papers delivered at 1962 symposium, discussing the history and distribution of dolphins, and the intelligence of whales, dolphins, and porpoises.

ELECTRICAL FISHING:
"Neurophysiology of Electric Fishing," by Richard Vibert, article, Transactions of the American Fisheries Society, vol. 92, no. 3, 1963, pp. 265-275, printed. Secretary, American Fisheries Society, P.O. Box 483, McLean, Va.

FATTY ACIDS:
"The Component Acids of the Fats of Some Indian Fresh Water Fishers," by S.P. Pathak and B.R. Reddy, article Biochemical Journal, vol. 85, December 1962, pp. 618-620, printed. Cambridge University Press, Bentley House, 200 Euston Rd., London NW1, England.

"The Determination of Glyceride Structure," by R.J. VanderWal, article, Journal of the American Oil Chemists' Society, vol. 40, June 1963, pp. 242-247, printed. American Oil Chemists' Society, 35 E. Wacker Dr., Chicago 1, Ill.

"The Determination of Polymers in Fats and Oils," by David Firestone, article, Journal of the American Oil Chemists' Society, vol. 40, June 1963, pp. 247-255, printed. American Oil Chemists' Society, 35 E. Wacker Dr., Chicago 1, Ill.

"Effect of a Fat-Free Diet and of Different Dietary Fatty Acids (Palmitate, Oleate, and Linoleate) on the Fatty Acid Composition of Fresh-Water Fish Lipids," by R. R. Brenner, D. V. Vazza, and M. E. DeTomas, article, Journal of Lipid Research, vol. 4, July 1963, pp. 341-345, printed. University Publishers, Inc., 59 E. 54th St., New York 22, N. Y.

"Molecular Dynamics and Glyceride Structure," by R. J. VanderWal, article, Journal of the American Oil Chemists' Society, vol. 40, June 1963, p. 256, printed. American Oil Chemists' Society, 35 E. Wacker Dr., Chicago 1, Ill.

FINLAND:
"Zur Systematik und Okologie Des Lachses und der Forellen in den Binnengewassern Finnlands" (On the Systematics and Ecology of the Salmon and Trout in the Inland Waters of Finland), by Ossi Seppovaara, article, Vum Societatis Zoological Botanical, Fennicae "Vanamo," vol. 24, no.1, pp. 1-86, printed. Vum Societatis Zoological Botanicae, Fennicae "Vanamo," Snellnaninkatii 9-11 Helsinki, Finland.

FISH BEHAVIOR:
Statistical Analysis of Differentiating Ability of Some Black Sea Fish, U.S.S.R., by M.P. Aronov, OTS 63-31613, 3 pp., printed, 50 cents, August 26, 1963. Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20235.

FISH CULTURE:
"Aerobnyi Sposob Udobreniya Prudov" (Aerobic Method of Fertilizing Ponds for Fish Breeding), by K.V. Gorbunov, article, Rybnoe Khoziaistvo, 1960 pp. 200-201, printed in Russian. V. Krasnosel'skaia 17 B-140, Moscow, U.S.S.R.

FISHERIES MANAGEMENT:
The Biological Principles Underlying the Rational Conduct of Fisheries, by L. S. Berdichevskii, 37 pp.,

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tures of foods. When compared with their frozen or canned counterparts, 3 of them, including shrimp creole, were considered superior; 15, including shellfish, were about the same; and 10 were rated poorer. Freeze-dried foods used in prepared mixtures received higher scores, on the average, than the same foods served plain. On the basis of these ratings, freeze-dried foods appear to have some prospects for volume production. Their chief market, however, may be in competion with conventionally-dried foods. Similar to these, freeze-dried products are lightweight, have long shelf life, and can be stored without refrigeration. In addition, they are said to retain more of their original physical structure, flavor, and nutritive value than air- or heat-dried products. There are some processed foods for which freeze-drying will replace the present processing method, according to the author.

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The Trawl Fishery for Rockfish in the Bering Sea, by A. V. Lestev, Translation Series No. 439, 15 pp., illus., processed, 1963. (Translated from the Russian, Sakhalinskoe Otdelenie Tikhookeanskogo N. I. Instituta Morksogo Rybnogo Khoziaistva i Okeanografii (TINRO), "Tekhnika Rybolovsta," Series, 1961, 26 pp.) Fisheries Research Board of Canada; Biological Station, Nanaimo, B. C., Canada.

RUMANIA:
Activities of Institute for Piscicultural Research and Planning, Rumania, by Aurelia Nicolau and G. Rosca, OTS 63-31699, 12 pp., printed, 50 cents, September 6, 1963. Office of Technical Services, U.S. Department of Commerce, Washington, D. C., 20235.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

RYUKYU ISLANDS:

Basic Data on the Economy of the Ryukyu Islands, by Ryotei Onaga and Susan M. Phillips, OBR 63-124, 16 pp., illus., printed, 15 cents, October 1963. Bureau of International Commerce, U.S. Department of Commerce, Washington, D.C. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.) Discusses general information on geography and climate, form of government, population, and education; structure of the economy; agriculture, forestry, and fisheries; mining, industry; electric power; and water supply. Also covers transportation and communications, insurance companies, finance, foreign trade, weights and measures, and the economic development program. The Ryukyuan fisheries and whaling industry have expanded in recent years. Between 1951-1961, fisheries landings increased from 8,300 metric tons to 18,052 tons. Marine products, notably sea shells, coral, and seaweed, have been an important source of earnings since 1950.

SAILFISH:

A Morphometric Study of Seasonal Concentrations of the Sailfish, ISTIOPHORUS ALBICANS, in the Northern Gulf of Mexico, with Notes on Other Gulf Istiophorids, by Norman G. Vick, 46 pp., printed, 1963. Texas Agricultural and Mechanical College, College Station, Texas.

SALMON:

The Coho Salmon (ONCORHYNCHUS KISUTCH Walbaum)--A Biological Sketch, by V.I. Gribanov, Translation Series No. 370, 83 pp., processed, 1962. (Translated from the Russian, Izvestiia Tikhookeanskogo N. I. Instituta Rybnogo Khoziaistva i Okeanografii (TINRO), vol. 28, 1948, pp. 43-101.) Fisheries Research Board of Canada, Biological Station, Nanaimo, B.C., Canada.

Correlation between the Processes of Early Gonad Ripening, and Transformation to the Seaward-Migrating Stage, Among Male Baltic Salmon (SALMO SALAR L.) Held in Ponds, by N. V. Evropeytseva, 5 pp., processed, 1963. Translated from the Russian, Zoologicheskii Zhurnal, vol. 39, no. 5, 1960, pp. 777-779. Fisheries Research Board of Canada, Biological Station, St. Andrews, N. B., Canada.

"Differential Scale Characters Among Species of Pacific Salmon," by Ted S. Y. Koo, article, University of Washington Publ. Fish., vol. 1, 1962, pp. 123-135, printed. University of Washington, Seattle, Wash.

"Girth-Length Relationships in Sockeye and Chum Salmon," by Robert H. Lander, article, Transactions of American Fisheries Society, vol. 92, no. 3, 1963, pp. 305-307, printed. Secretary, American Fisheries Society, P. O. Box 483, McLean, Va.

The Hydrology of the Komandorsky--Kamchatka Region and the Salmon Migrations during the Spring and Summer, by V. A. Burkov, Translation Series No. 356, 9 pp., processed, December 1962. (Translated from the Russian, Ikhtiologicheskaia Komissiia Akademii Nauk SSSR, Trudy Soveshchanii, no. 10, 1960, pp. 165-172.) Fisheries Research Board of Canada, Biological Station, Nanaimo, B. C., Canada.

"The Influence of Oxygen Concentration on the Swimming Performance of Juvenile Pacific Salmon at Various Temperatures," by Gerald E., Davis and others, article, Transactions of the American Fisheries Society, vol. 92, no. 2, 1963, pp. 111-124, printed. Secretary, American Fisheries Society, P. O. Box 483, McLean, Va.

"Natural Spawning Success of Landlocked Salmon, Salmo salar," by Kendall Warner, article, Transactions of the American Fisheries Society, vol. 92, no. 2, 1963, pp. 161-164, printed. Secretary, American Fisheries Society, P. O. Box 483, McLean, Va.

"The Relation between Oxygen Uptake and Swimming Speed in Young Sockeye Salmon," by J. R. Brett, article, American Zoologist, vol. 2, no. 3, 1962, p. 394, printed. The Society of American Zoologist, 104 Liberty St., Utica, N. Y.

"Some Aspects of Olfactory and Visual Responses in Pacific Salmon," by J.R. Brett and C. Groot, article, Journal of the Fisheries Research Board of Canada, vol. 20, no. 2, 1963, pp. 287-303, printed. Queen's Printer and Controller of Stationery, Ottawa, Canada.

"Some Effects of Simultaneous Variation in Salinity, Temperature and Dissolved Oxygen on the Resistance of Young Coho Salmon to a Toxic Substance," by D.F. Alderdice, article, Journal of the Fisheries Research Board of Canada, vol. 20, no. 2, 1963, pp. 525-550, printed. Queen's Printer and Controller of Stationery, Ottawa, Canada.

"O Svyazyakh Tempa Rosta i Chislennosti Krasnoi." (Relation between Growth Rate and Abundance of Sockeye Salmon), by F. V. Krogius, article, Trudy Soveshchanii Ikhtiol. Komissiya Akad. Nauk SSSR, vol. 13, 1961, pp. 132-146, printed in Russian. Four Continent Book Corp., 156 5th Ave., New York 10, N.Y.

"The Uptake and Detoxification of C^{14} - Labelled DDT in Atlantic Salmon, Salmo salar," by F.H. Premdas and J. M. Anderson, article, Journal of the Fisheries Research Board of Canada, vol. 20, no. 3, 1963, pp. 827-837, printed. Queen's Printer and Controller of Stationery, Ottawa, Canada.

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The Pilchard of South West Africa (SARDINOPS OCELLATA), Temperature: Its Annual Cycles and Relation to Wind and Spawning, by G. H. Stander, Investigational Report No. 9, 55 pp., illus., printed, 1963. Administration of South West Africa, Windhoek, South West Africa.

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"Condition of the Bay Scallop, Aequipecten irradians, in Relation to Age and the Environment," by Richard A. Cooper and Nelson Marshall, article, Chesapeake Science, vol. 4, no. 3, September 1963, pp. 126-134, illus., printed, single copy 75 cents. Chesapeake Biological Laboratory, Natural Resources Institute of the University of Maryland, Solomons, Md.

"Some Morphological and Ecological Differences in Two Closely Related Species of Scallops, Aequipecten

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irradians Lamarack and Aequipecten gibbus Dall, from the Gulf of Mexico, by A. N. Sastry, Contribution No. 189, 7 pp., illus., printed. (Reprinted from The Quarterly Journal of the Florida Academy of Sciences, vol. 25, no. 2, June 1962.) Oceanographic Institute, Florida State University, Tallahassee, Fla.

SCUBA DIVING:
"La Embriaguez y la Enfermedad de los Escafandristas" (The Dizziness and Illness of Divers), article, Iberica, vol. 41, no. 17, November 1963, pp. 438-440, illus., printed in Spanish, single copy 15 ptas. (about 25 U.S. cents). Iberica, Palau, 3, Apartado 759, Barcelona-2, Spain.

SEA LAMPREY:
"Estimation of the Brook and Sea Lamprey Ammocoete Populations of Three Streams," by Bernard R. Smith and Alberton L. McLain, article, Great Lakes Fish Comm. Tech. Rept., no. 4, 1962, pp. 1-18, printed. University of Michigan, Ann Arbor, Mich.

"Lethal Temperatures of the Developmental Stages of the Sea Lamprey, Petromyzon marinus L.," by R. W. McCauley, article, Journal of the Fisheries Research Board of Canada, vol. 20, no. 2, 1963, pp. 483-490, printed. Queen's Printer and Controller of Stationery, Ottawa, Canada.

SEAWEED:
"The Effect of Seaweed Carotenoids on Egg Yolk Coloration," by Arne Jensen, article, Poultry Science, vol. 42, July 1963, pp. 912-916, printed. Poultry Science Association, Kansas State College, Manhattan, Kans.

"Polysaccharides of the Green Seaweed Codium fragile," by J. Love and Elizabeth Percival, article, Biochemical Journal, vol. 84, July 1962, p. 29P, printed. Cambridge University Press, Bentley House, 200 Euston Rd., London NW1, England.

"Quality of Kombu, Edible Seaweeds Belonging to the Laminariaceae. V--Difference in the Thickness and in the Content of Nitrogen in Kombu Blade (Laminaria japonica)," by Ayako Okumura and others, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 28, November 1962, pp. 1123-1127, printed. Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku, Tokyo, Japan.

"Recent Laver Cultivation in Japan," by M. Kurogi, article, Fishing News International, vol. 2, no. 3, July-September 1963, pp. 269, 273-274, illus., printed, single copy 6s. 6d. (about 95 U.S. cents). Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet St., London EC4, England.

"Viscosities of Funori Extractive in Aqueous Potassium Chloride," by Yuzo Enda and Akira Kishimoto, article Bulletin of the Japanese Society of Scientific Fisheries, vol. 28, August 1962, pp. 799-802, printed. Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku, Tokyo, Japan.

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"The Shark Problem," by D.H. Davies, article, South African Journal of Science, vol. 58, no. 9, 1962, pp. 253-258, printed. South African Association for the Advancement of Science, Johannesburg, South Africa Republic.

SHELLFISH:
"Purification and Sterilization of Shellfish," by Elliot B. Dewberry, article, Food Manufacture, vol. 38, July 1963, pp. 357-362, printed. Leonard Hill Ltd., Stratford House, 9 Eden Street, London NW1, England.

SHRIMP:
"Tariff Board Inquiry on Prawns," article, Fisheries Newsletter, vol. 22, no. 11, November 1963, pp. 17-18, 20, printed. Commonwealth Fisheries Office, Department of Primary Industry, Canberra, Australia. Tariff Board held a public hearing in Brisbane on September 13 and one in Canberra on October 3, 1963, in the course of its inquiry into whether assistance should be given to the production of "shrimps, prawns, shrimp meat and prawn meat, preserved by cold process;" if so, the nature and extent of such assistance; and, if the Board found for assistance by tariff, what rates of duty should be provided. Testimony was given by several witnesses. After the inquiry was closed, the Board reported its findings to the Minister for Trade.

SMALL BUSINESS MANAGEMENT:
Guide to Civil Defense Management in the Food Industry, Agricultural Handbook No. 254, 34 pp., illus., printed, November 1963. Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., 20250. The history of mankind and the records of wars clearly demonstrate that food is a prime weapon, target, and element of survival. It should be obvious, therefore, that there is a pressing need in the food industry for careful planning and continuing cooperation with local, State and Federal governments in preparing a national survival program. This handbook discusses in detail orientation to civil defense planning in the food industry, civil defense preparations, industry-Government cooperation for community survival, and operations during the survival period.

Travel, Entertainment, and Gift Expenses, Internal Revenue Service Publication No. 463, 18 pp., printed, 15 cents, 1963. Internal Revenue Service, U. S. Department of Treasury, Washington, D. C. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402.) A booklet containing detailed information on the new rules enacted by Congress for deducting business travel, entertainment, and gift expenses. The booklet also explains the recordkeeping substantiation requirements. Numerous examples are given to illustrate how the rules operate and the specific kinds of information which should be recorded and maintained in various circumstances. A chart which shows at a glance the factors to be proved in substantiating elements of an expenditure is of special interest.

SMELT:
"Taxonomic and Ecological Studies of the Genus Hypomesus of Japan," by Keikichi Hamada, article, Memoirs of the Faculty of Fisheries, vol. 9, no. 1, 1961, pp. 1-55, printed. The Faculty of Fisheries, Hokkaido University, Hakodate, Japan.

SMOKING:
Smokehouses and the Smoke Curing of Fish, compiled by Iola I. Berg, 47 pp., illus., processed. Washington

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

State Department of Fisheries, 115 General Administration Bldg., Olympia, Wash. Discusses in detail, with accompanying diagrams, smoke-curing principles, smokehouses, methods of hanging fish for smoking, hot smoking, and cold smoking. Also includes information on smoking method for sportsmen, construction of the controlled smokehouse, smoking processes, portable smoker and barbecue grill, and recipes for preparing smoked fish dishes.

SPOILAGE:
"Effects of Tylosin and Nisin on Canned Food Spoilage Bacteria," by C. B. Denny, L.E. Sharpe, and C. W. Bohler, article, Applied Microbiology, vol. 9, no. 2, 1961, pp. 108-110, printed. Williams and Wilkins Co., 428 E. Preston St., Baltimore 2, Md.

STATISTICS:
Statistical Services of the United States Government, 143 pp., printed, $1, revised edition 1963. Office of Statistical Standards, Bureau of the Budget, Executive Office of the President, Washington, D. C. (For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C., 20402.) Part I describes the statistical system of the Federal Government. In a section on organization it describes the procedures followed to achieve coordination within a decentralized statistical system, and distinguishes between the various types of statistical agencies. Part II presents brief descriptions of the principal economic and social statistical series collected by Government agencies. For each of about 50 subjects it tells what agencies are concerned and what kinds of data are collected and made available. Part III contains a brief statement of the statistical responsibilities of each agency and a list of its principal statistical publications.

STERN TRAWLERS:
"Stern Trawlers," article, Canadian Fisherman, vol. 49, no. 5, 1962, pp. 19-34, illus., printed. National Business Publications Ltd., Gardenvale, Que., Canada.

STRIPED BASS:
"Effect of Ocean Temperature on the Seaward Movements of Striped Bass, Roccus saxatilis, on the Pacific Coast," by John Radovich, article, California Fish and Game, vol. 49, no. 3, 1963, pp. 191-206, printed. California Department of Fish and Game, 722 Capital Ave., Sacramento 14, Calif.

TAGGING:
"Estimates of Mortality Rates from Tag Recoveries," by G. J. Paulik, article, Biometrics, vol. 19, no. 1, 1963, pp. 28-57, printed. Department of Statistics, Virginia Polytechnic Institute, Blacksburg, Va.

"The Movement of Tagged Great Slave Lake Fish," by J.J. Keleher, article, Journal of the Fisheries Research Board of Canada, vol. 20, no. 2, 1963, pp. 319-326, printed. Queen's Printer & Controller of Stationery, Ottawa, Canada.

TAIWAN:
Taiwan Fisheries Yearbook, 1963 Edition, 212 pp., illus., printed in Chinese and English; August 1963. Taiwan Fisheries Bureau, Department of Agriculture and Forestry, Provincial Government of Taiwan, Taipei, Taiwan. Contains statistical tables on fishermen's organizations and membership, number of fishing vessels, status of ice-making and cold-storage industries, fisheries production in quantity and value, and quantity of supply and sale of fishery products and their average value at principal fish markets. Also includes data on processed marine products, fish culture area, production of fish fries, number of casualties of fishermen, losses and damages to fishing craft, and marine products trade. Most data are for 1962.

TENNESSEE VALLEY AUTHORITY:
Tributary Area Development in the Tennessee Valley, 16 pp., illus., printed, 1963. Tennessee Valley Authority, Knoxville, Tenn.

TRADE LISTS:
The U. S. Department of Commerce has published the following trade list. Copies may be obtained by firms in the United States from the Commercial Intelligence Division, Office of Trade Promotion, Bureau of International Commerce, U. S. Department of Commerce, Washington, D. C., 20230, or from Department of Commerce field offices at $1 each.

Canneries and Frozen Foods--Producers and Exporters--Thailand, 8 pp., August 1963. Lists the names and addresses, size of firms, and types of products (including fish and shrimp) handled by each firm.

TRAWLING:
"Les Engins de Peche--Le Chalutage, les Operations de Peche" (Fishing Gear--Trawling, Fishing Operations), by A. Percier, article, France Peche, no. 78, November 1963, pp. 55-56, 58, illus., printed in French single copy 2.5 F (about 50 U.S. cents). France Peche, Boite Postale 179, Lorient, France.

"How Some Fish Escape the Trawl," article, New Scientist, vol. 18, May 1963, p. 361, printed. Cromwell House, Fulwood Pl., High Holborn, London WC1, England.

TRAWLS:
"Un Chalut Mediterraneen Perfectionne" (An Improved Mediterranean Trawl), by L. Farina, article, France Peche, no. 78, November 1963, pp. 39-41, illus., printed in French, single copy 2.50 F (about 50 U.S. cents). France Peche, Boite Postale 179, Lorient, France.

TROUT:
"Effect of Hatchery Rearing Conditions on Stream Survival of Brown Trout," by Alfred W. Eipper, article, Transactions of the American Fisheries Society, vol. 92, no. 2, 1963, pp. 132-139, printed. Secretary, American Fisheries Society, P.O. Box 483, McLean, Va.

"The Effect of Neotetrazolium on the Newly Fertilized Eggs of the Brook Trout, Salvelinus fontinalis (Mitchill)," by Alfred Perlmutter and William Antopol, article, Copeia, no. 1, 1963, pp. 166-168, printed. Copeia, American Society of Ichthyologists and Herpetologists, 18111 Nordhoff St., Northridge, Calif.

"Influence of Pond Formation on Brook Trout Movements and Angling Success," by M. W. Smith, article, Journal of the Fisheries Research Board of Canada,

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vol. 20, no. 2, 1963, pp. 327-345, printed. Queen's Printer & Controller of Stationery, Ottawa, Canada.

"The Recovery of Tagged Lake Trout, Salvelinus namaycush, from Lake Simcoe, Ontario," by Hugh H. McCrimmon, article, Transactions of American Fisheries Society, vol. 92, no. 3, 1963, pp. 315-317, printed. Secretary, American Fisheries Society, P. O. Box 483, McLean, Va.

Resultats des Deversements de Truites d'Elevage Marquees Dans Quelques Riveres du Puy-de-Dome, de 1958 a 1960 (Results of the Escapement of cultured Trout Tagged in Some Rivers of Puy-de-Dome from 1958 to 1960), by R. Cuinat. 13 pp., illus., printed in French. Station d'Hydrobiologie Appliquee de Biarritz, Biarritz, France.

"The Seaward Migration and Return of Hatchery-Reared Steelhead Trout, Salmo gairdneri Richardson, in the Alsea River, Oregon," by Harry H. Wagner, Richard L. Wallace, and Homer J. Campbell, article, Transactions of the American Fisheries Society, vol. 92, no. 3, 1963, pp. 202-210, printed. Secretary, American Fisheries Society, P. O. Box 483, McLean, Va.

TUNA:

"Studies on the Change of Frozen Skip-Jack Muscle during Storage," by J. I. Nishimoto, article, Refrigeration, vol. 38, no. 424, February 1963, pp. 1-15, illus., printed. Japanese Association of Refrigeration, Kenchiku Kaikan Bldg., 3-1 Ginza Nishi, Chuo-ku, Tokyo, Japan.

"Tuna Fatty Acids. I--Initial Studies on the Composition of the Light and Dark Meats of Bluefin Tuna (Thunnus thynnus) Structural Isomers of the Monoenoic Fatty Acids; II--Investigations of the Composition of Raw and Processed Domestic Tuna," by W. T. Roubal; articles, Journal of the American Oil Chemists' Society, vol. 40, June 1963, pp. 213-218, printed. American Oil Chemists' Society, 35 E. Wacker Dr., Chicago 1, Ill.

U.S.S.R.

Acclimatization of Fish and of Invertebrates, USSR, by A.F. Karpevich, OTS 63-31455, 28 pp., printed, 75 cents, August 6, 1963. Office of Technical Services, U.S. Department of Commerce, Washington, D.C., 20235.

Advancing International Relations in Fishing Industry, USSR, 8 pp., printed, 50 cents, June 18, 1963. Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20235.

Basic Factors in the Fluctuations of the Stocks of Sturgeons and Lesser Fishes in the Sea of Azov (Translated from the Russian, Trudy Soveshchanii Ikhtiologicheskoi Komissii Akademii Nauk SSSR, No. 13, 1961, pp. 147-157). Translation Series No. 414, by E. G. Boiko, 13 pp., illus., processed 1963. Fisheries Research Board of Canada, Biological Station, Nanaimo, B. C., Canada.

Fishing Economy, 1960, Vol. 36, No. 7; Selected Translations, OTS 63-21559, 28 pp., printed, 75 cents. (Translated from the Russian Rybnoe Khozyasitvo, vol. 36, no. 7, 1960, pp. 15-43.) Office of Technical Services, U.S. Department of Commerce, Washington, D. C., 20235.

Scientific Research Institute of Mechanization of the Fishing Industry (NIMRP), by P.A. Kuraptsev, OTS-63-21559, 25 pp., processed, 1963. (Translated from the Russian Rybnoe Khoziaistvo, No. 7, 1960, pp. 15-18.) Office of Technical Services, U.S. Department of Commerce, Washington, D. C. 20235.

"Soviet Fishing in African Waters," article, Food Technology, vol. 17, p. 61, July 1963, printed. The Garrard Press, 510 N. Hickory, Champaign, Ill.

Translations on Soviet Fishery Research, OTS 63-31318, 55 pp., illus., printed, $1.50, July 8, 1963. Office of Technical Services, U.S. Department of Commerce, Washington, D. C., 20235.

WHALING:

"The Art and Science of Whaling," by Bruce Young, article, Western Fisheries, vol. 66, August 1963, pp. 14-15, 45-58, printed. Roy Wrigley Publications Ltd., 1104 Hornby St., Vancouver 1, B. C., Canada.

"Dynamical Relationships between Variations of the Antarctic Fin Whale Catch and Catcher's Day's Work," by Takeyuki Doi, article, Bulletin of the Japanese Society of Scientific Fisheries, vol. 28, December 1962, pp. 1168-1172, printed. Japanese Society of Scientific Fisheries, Shiba-Kaigandori 6, Minato-ku Tokyo, Japan.

YELLOW PIKE:

"Distribution and Movement of Marked Walleyes in Oneida Lake, New York," by John L. Forney, article, Transactions of the American Fisheries Society, vol. 92, no.1, 1963, pp. 47-52, printed. Secretary, American Fisheries Society, P.O. Box 483, McLean, Va.

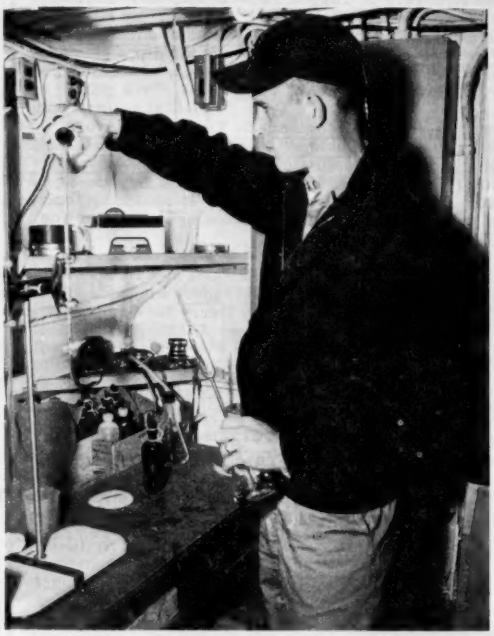
WHITEFISH:

"Effects of Artificial Propagation and the Weather on Recruitment in the Lake Ontario Whitefish Fishery, by W.J. Christie, article, Journal of the Fisheries Research Board of Canada, vol. 20, no.3, 1963, pp. 597-646, printed. Queen's Printer and Controller of Stationery, Ottawa, Canada.

EMPLOYMENT OUTLOOK FOR OCEANOGRAPHERS

In recent years, the growing realization of the importance of the oceans to the Nation's welfare and security has heightened interest in oceanography and has opened new fields for specialists in the science.

The ocean, which covers more than two-thirds of the earth's surface, supplies food and minerals, influences the climate, provides a medium of transportation, and offers means of recreation. Oceanographers are the scientists who study the ocean in all its aspects--its characteristics, movements, and plants and animals. The results of their studies not only extend basic scientific knowledge, but also contribute to the development of practical methods for use in such operations as charting and forecasting currents, ice conditions, and ocean waves; improving fisheries; and providing defense against enemy attack.



Oceanographer conducts sea water oxygen analysis aboard ship.

Oceanographers are usually specialists in one of the four main branches of the profession. Biological oceanographers (marine biologists) study the ocean's plant and animal life, which ranges from microscopic plankton to giant squid and whales. Physical oceanographers study the physical aspects of the ocean, such as its density, temperature, and ability to transmit light and sound; and the movement of the sea, such as waves, tides, and currents; and the relationship between the sea and the atmosphere. Geological oceanographers (marine geologists) study the ocean bottom--its topographic features and the rocks and sediments found there. Chemical oceanographers investigate the chemical composition of the ocean waters and bottom, which include at least traces of more than half of the total number of known physical elements.

Employment opportunities for oceanographers are expected to be excellent throughout the 1960's, particularly for those with advanced degrees. Well-trained persons with bachelor's degrees in related sciences and with some formal training in oceanography should also have favorable opportunities, primarily as research assistants and in routine analytical positions.

The outlook is for rapid growth of the small profession, both during the 1960 decade and over the long run.

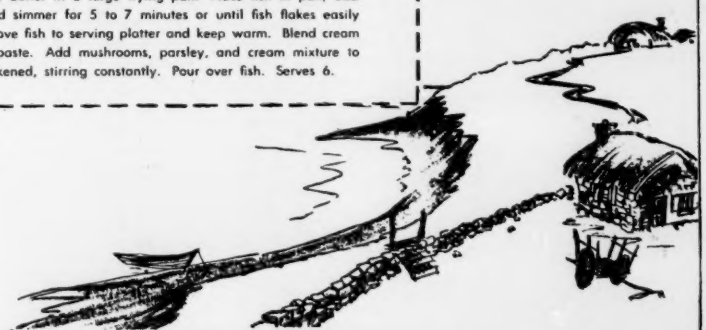
--A reprint from the Occupational Outlook Quarterly, May 1963 (Vol. 7, No. 2)
U. S. Department of Labor, Bureau of Labor Statistics.

SHANNON SALMON STEAKS

Shannon Salmon Steaks simmered in cider until succulent and topped with a colorful mushroom sauce; here is real eating. Salmon steaks, fresh from cold North Pacific waters, have become a favorite throughout the country. This new recipe, delightful in its simplicity, yet outstanding in its appeal, will aptly awaken average appetites.

- 2 pounds salmon steaks or other fish steaks, fresh or frozen
- 2 tablespoons butter or margarine
- ½ cup cider or apple juice
- 1 teaspoon salt
- ½ cup coffee cream
- 1 tablespoon flour
- 1 can (4 ounces) sliced mushrooms, drained
- 2 tablespoons chopped parsley

Thaw frozen steaks. Melt butter in a large frying pan. Place fish in pan; add cider and salt. Cover pan and simmer for 5 to 7 minutes or until fish flakes easily when tested with a fork. Remove fish to serving platter and keep warm. Blend cream and flour to make a smooth paste. Add mushrooms, parsley, and cream mixture to liquid in pan. Cook until thickened, stirring constantly. Pour over fish. Serves 6.



--From Fisheries Marketing Bulletin: "Protein Treasure from the Seven Seas." Issued by the National Marketing Services Office, U. S. Bureau of Commercial Fisheries, Chicago 5, Ill.

A PREVIEW OF THE NATIONAL FISHERIES CENTER AND AQUARIUM

The National Fisheries Center and Aquarium, authorized by Congress in late 1962, will house a unique population of aquatic animals. A vast variety of creatures from waters around the globe will be available at the Center in Washington, D. C., for scientific research, for education, and for entertainment.

An artist's concept of the National Fisheries Center and Aquarium.

The new Center is expected to be completed by about 1967. It will be a great attraction for scientists and visitors from all over the world. It will be the focus for all aquariums in the country, and will provide leadership in the study of aquatic animals for all scientific purposes. By disseminating information about aquatic life, the Center will help people understand the importance of marine conservation.

When completed, the Center will house about 1,300 different kinds of aquatic animals from all over the world. A great variety of other land and water inhabitants besides fish also will be included in the collection.

The Center's permanent scientific staff will work with research professors, graduate students, and outstanding fishery workers from foreign countries. Their projects will include research in genetics; reproduction; nutrition studies; fish diseases; experimental ecology; behavior of aquatic organisms; antibiotics produced by marine animals; and other pressing fishery problems, many related to human biology and medicine.

The great diversity of fresh-water and marine fishes, mammals, and other aquatic forms will permit the study of species not usually available. The study of these animals can be important to research in human and animal diseases. In some respects fish are superior to warm-blooded animals for experiments. The metabolic rate can be controlled in fish by controlling the temperature of the water.

Research at the Center will provide information about fish for human consumption.

The new field of marine pharmocology may help develop new biologicals of value in treating human illness, as well as diseases of some of our important fresh water and marine fishes.

At the Center visitors will see educational exhibits on fish and fishery products and research that they can find nowhere else. The animals will be displayed in pools, tanks, and other facilities which meet their living requirements, to give the public an opportunity to study aquatic community life. The vast range of aquatic habitat will be illustrated in the accurate replicas of a fresh-water living stream progressing from a mountain lake through various levels until it reaches the sea, the ocean with its range from a coral reef to dark abyss. In addition, a tropical section will exhibit a wide variety of fish, both fresh water and marine.

Material covering the entire range of fisheries and aquarium work will be available at the Center. These will include studies of fishery and aquatic life, illustrated catalogs of aquariums, specimen brochures, and films, and photographic materials which explain the work and objectives of the National Fisheries Center and of the research to be undertaken.